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STO

COMMON TREES of Indiana

By

JOSEPH S. ILLICK

and

CHARLES C. DEAM

State Forester of Indiana

A handy pocket manual of the Common and Introduced Trees of Indiana

Presented to the Schools of Indiana

By the

Charles Lathrop Pack Forestry Trust

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Published and Distributed

By

The American Tree Association

Washington, D. C.

1927

BLACK & COLD

"If the Nation Saves the Trees
The Trees will Save the Nation"

—CHARLES LATHROP PACK
President American Tree Association

With grateful acknowledgment to the United States Forest Service for the use of 14 cuts.

812390

TEN COMMANDMENTS OF THE TRAIL

By HENRY WELLINGTON WACK, F. R. G. S.

(Copyright, 1926)

By Courtesy of Nature Magazine.

FIRST. Use the By-Ways—not the Highways.

SECOND. Don't go Walking to beg a Ride. The Auto-riding Hiker is a Fraud.

THIRD. Everything belongs to Somebody. Then respect all Private and Public Property. Be not the Author of its displacement, disfigurement or disappearance.

FOURTH. Keep off Prohibited Ground. Neither fish nor hunt on Posted Land. Trespassers create bad will toward all Nature Lovers, Campers and Sportsmen.

FIFTH. Leave Gates, Fences, Signs, Stakes, growing grain and crops as you found them. Walk around, never across, all planted fields.

SIXTH. Pluck no wild flowers—they belong to all. Leave them for all to enjoy. Pick no cultivated Fruit. Resist the boyhood call of the Melon Patch!

SEVENTH. Clear away twigs, leaves and pine needles down to moist earth, before laying a Camp Fire one foot square. Keep cook fires low, and less than one-fifth the size of the clearing. Large fires prevent cooking, but destroy forests. Only small fires are safe, quick and comfortable to cook with. Put camp fires out with Water, not with a kick. See that the peat or humus around the fire is not burning underground to destroy the woodland after you have left. A single spark may fly a hundred feet and burn a million trees. Arson is no greater crime than stupidity or neglect on the Trail.

EIGHTH. Leave campsites clean; Burn all garbage; replace cut Firewood and Supplies found in camps. You are the Guest of an absent Host—not the vandal of a present opportunity. Leave a note of thanks in a wilderness shelter you have used. Put it in order before you depart.

NINTH. Silence, or speech in whispers, is the sign of trail experience and good woodmanship. Only fools and asses bray in a Forest.

TENTH. When you leave a beautiful Woodland or descend from a Mountain, stop, turn around, and gaze reverently awhile. Then thank God for the boon our Forests are to all Mankind. Treat Life's Trail responsibly and keep it clean. To the seeing eye and the generous soul, Nature's beauty—her mysteries and charm—forever call us to her Trails!

This handbook aims to open the pathway to the delightful study of trees, and to help fashion a right attitude toward the green and glorious out-of-doors. It was prepared to satisfy a growing demand, particularly among the young folks of this State, for interesting and helpful information about the common trees.

Each year a greater number of boys and girls go out into the fields and forests to take part in some outdoor program of education. To be able to participate in such a wholesome and practical program of education is to enjoy one of the greatest educational privileges ever made available to the young folks of any land.

The inspirational and descriptive sections of this book are offered to its readers to study, because a true appreciation of trees and a correct working knowledge of them will go far to guarantee a sound program of forest conservation, one of the most vital economic problems now confronting the American people.

All the common trees native to this State and a number of introduced trees are described in this handbook. A few of the less common trees had to be omitted. Whoever becomes acquainted with the trees treated in this handbook will have a good working knowledge of the trees of the State and be prepared to appreciate their importance in everyday life.

FOREWORD

By CHARLES LATHROP PACK

President of the American Tree Association

WASHINGTON, D. C.

ALL GOOD THINGS must be known to be appreciated. There are many things so common in our daily lives that we accept them with little thought. So much a part of our existence they are that they become, perhaps, little known and often less appreciated. Trees run this risk.

Shading us, protecting us, purifying our water supply, furnishing the homes that are built from them, providing the paper we use and serving us in thousands of ways, trees deserve to be known and to be appreciated. Without them existence would be worth little.

Our country is the greatest in the world. In wealth, in standards of living and in comforts it stands alone. Nature endowed it with boundless resources. We have taken this wealth and built a great nation. The trees in our forests have been our greatest resources; they have made possible what has been accomplished.

When our forefathers came to this vast land it was covered with nearly nine hundred million acres of forest. Today only one-fifth of this immense resource remains. A quarter of a billion acres of this original forest are growing young trees, many of little value. More than eighty million other acres whose destiny is to produce forests alone, are producing nothing. Of what remains to us of our forests, we are using four times as fast as we are allowing or helping Nature to replace.

That is the situation with our forest. One tree or one hundred trees do not make a forest. But one tree stands for the forest. We send one man to our Congress to speak for thousands. We can plant a tree in our dooryard and let it speak for millions.

This is the problem of today. It is a problem that the citizens of tomorrow will have brought home to them. They will need to know the trees to meet it.

This little book is the personal story of the trees that grow commonly in the soil of our State. It is the story of the trees whose forefathers peopled the great majority of the acres of our State. They are your trees; citizens of your State; companions of your life; servants of your comfort.

Knowledge of trees is more than a duty of good citizens. It is a joy to the one who has this knowledge. The tree is a

living thing. It grows as we grow. It pushes upward as we should push upward in life. It spreads its branches outward, as we should spread the branches of our minds, broadened by experience in life. The tree is a constant lesson to humanity,—a lesson in erectness, in courage, in dignity and in steadfastness. It serves us in thousands of material ways, so should we know it that it may serve us in human ways as a guide and a friend.

Throughout our great country our future citizens are everywhere widening their acquaintance with trees. Through various organizations, as well as the schools, they are discovering the happiness that this knowledge brings.

This little book will serve as a letter of introduction to the common trees in your yard, on your street, in the woodlot on the edge of the city and in the young forest beyond. You can use it freely and many times. It will give you the knowledge that leads to appreciation, and this will lead to enjoyment even beyond expectation.

A NOTICE

(A notice found nailed to a tree in one of the parks of Seville, Spain. Copied from the book "Spanish Sunshine," by Elinor Elsner.)

(By Courtesy of Mrs. Samuel Heilner)

"To the Wayfarer—

Ye who pass by and would raise your hand against me
Harken ere you harm me!
I am the heat of your hearth on the cold winter nights,
The friendly shade screening you from the summer sun.
My fruits are refreshing draughts,
Quenching your thirst as your journey on,
I am the beam that holds your house,
The board of your table,
The bed on which you lie,
And the timber that builds your boat,
I am the handle of your hoe,
The door of your homestead,
The wood of your cradle,
And the shell of your coffin.
I am the bread of kindness, and the flower of beauty.
Ye who pass by, listen to my prayer; harm me not."

EACH CITIZEN'S DUTY

By HON. ED JACKSON, *Governor of Indiana*

THE standard of living in any nation is in direct proportion to the amount of wood used per capita. From the cradle to the grave our trees render us economic service by supplying us wood for warmth, shelter and industry. They shelter our wild life, regulate our water supply, and afford a glorious picture throughout the landscape.

The virgin Indiana forest of magnificent ash, tulip, oak, maple, and walnut has been the first of our natural resources to be so completely harvested. Our natural forest reproduction upon which depends the restoration of this important resource has been subjected to damages by fire and grazing until many of our Indiana woodlots are either completely destroyed or in immediate danger of destruction.

The Department of Conservation through its Forestry Division is taking the important primary measures of forest restoration in Indiana by classifying forest land for tax exemption, raising forest seedlings at cost for reclaiming idle land, and furnishing forestry advice to farmers and other land owners of Indiana.

Their important work must be aided by strong public sentiment and a widespread public interest in trees. This book will aid in creating such an interest.

The unproductive condition of our native woodlands costs the citizens of Indiana at least $15,000,000 a year for the imported lumber alone which might be grown in our own state. A greater interest in trees and forestry is an important part of each citizen's duty.

EXPRESSIONS OF OPINION

FORESTS OF INDIANA

Of all the natural resources of Indiana, its forests were by far the greatest. A century of thoughtless wastefulness has almost completely destroyed this vast wealth. Only here and there do occasional relic trees tell of the splendor of the virgin forests.

The scattered woodlots remaining are of such poor quality and meagre stand that they give little conception of the original forest.

As an incidental result of this wastefulness, we have approximately a million acres of abandoned and wasting land, and this wrecked area is rapidly increasing.

If we reclaim our inheritance, intensive forestry must be carried on for many years. Forest and soil are the only natural resources that can be restored and then maintained in ever-increasing values. The effort to restore and maintain soil fertility is already well in hand.

The next step, and at the same time the most exigent economic problem confronting the state, is the reclamation of these waste lands by afforestation and the reinforcing of existing wooded areas with species of high value.

Every loyal and intelligent citizen of Indiana should lend enthusiastic support to this great task.

That through a fuller knowledge of our forests, a wider interest may be awakened and that the coming generation may see more clearly than their fathers the imperative need of conserving and maintaining this great asset, this book has been prepared.

STANLEY COULTER,
Chairman of the Department of Conservation,
State of Indiana.

EVERY CITIZEN SHOULD AID

Forestry offers perhaps the greatest opportunity for constructive work in Conservation. Other great natural resources, our coal, gas and oil, which have been wasted with such criminal extravagance, can never be restored.

But while our forests have been exploited with shameful recklessness, they may, in a measure at least, be restored by a persistent and intensive treatment of existing "stands" and the afforestation of denuded areas.

A million acres of denuded and wasting land and scant stands of inferior species on existing wooded areas together furnish an exigent economic problem which the Department of Conservation is endeavoring to solve.

At the best, the problem would be difficult; under the financial limitations of the Department it is one involving years and decades of patient and intelligent effort.

The situation is one that should challenge not only the interest but the patriotism of every citizen of the State. A great natural resource wasted almost to extinction, yet one capable of again being made a great state asset by means of long continued, co-operative work.

This much to be desired consummation cannot be brought about by the Department of Conservation working alone. Every community, every land owner, every citizen, should lend to the movement an increasingly intelligent and active support.

The existing conditions should not be a cause for despondency, but a clarion call to a civic duty. The schools should teach the vital necessity of afforestation and of improving and maintaining existing wooded areas. Indifference and lethargy must be replaced by intelligent interest and action if the problem is solved.

Quite apart from the economic values involved are the higher and more far-reaching aesthetic and recreational values implicit in the maintenance and extension of the forested areas of Indiana.

More and more are our citizens demanding recreational opportunities and demanding that they be furnished amid beautiful surroundings. Our forests, more than any other single natural feature, meet this demand. Out of this demand has grown Indiana's unrivaled park system, its game preserves, its state forests, its "monuments" perpetuating not merely beauty of surrounding, but the beauty of life and achievement of the days long gone.

Every citizen proud of Indiana, full of hope for her future, should lend aid to this Division of the Department of Conservation to the end that the former wealth and beauty of the state may in a measure be restored and through us become the perpetual heritage of our children and our children's children.

RICHARD LIEBER, *Director,*
Department of Conservation, State of Indiana.

WHY STUDY OUR TREES?

By CHAS. C. DEAM, *State Forester*

A FOREST is a collection of trees. For the best management of a forest, it is necessary to know the several kinds of trees of which it is, or should be composed. Thus the study of the trees becomes of prime economic importance. Trees have contributed so much to our wealth and happiness that a study of them needs no argument.

The study of trees is far reaching. Take, for example, the study of the white oak, which is one of our most common and valuable trees. The first step is to distinguish this tree from trees of other families of trees, and lastly to know it from its brother oaks. This may be done by closely observing the bark, buds, leaves, fruit and wood. This kind of study develops discriminating observation and careful deductions. Further, the study of the white oak will teach geography, because an interest will be aroused in knowing where this tree is found. Does it grow as far east as Maine, as far south as Florida and as far west as California? It will teach geology and soils, because it will soon be learned that this tree grows both in low rich woods, and on ridges in almost pure sand and on ridges of poor clay or stony soils. Seeing this tree growing in different places shows that it reaches its maximum size in certain kinds of soil, while it is entirely absent in other kinds of soils which are derived from other kinds of rock. Why is this? Observations will show that this tree is of excellent form and is long lived. These qualities recommend it for shade tree planting. In the woods it is seen that it is the injured tree that is usually blown over by the wind. This means that fire and grazing should not be permitted in the woods, because they injure more trees than all other agencies. Further observation will often show that the tree sometimes during its life has been attacked by some kind of insect. Scientists tell us that over 400 kinds of insects feed upon the white oak, but that none are so destructive as to kill it. Now and then a hole may be seen in a large branch, in which a squirrel or bird may make its home. The large collection of dead leaves and twigs sometimes seen in the top is the place where some squirrel or bird has reared its family.

No one can walk in the woods and study the trees without becoming interested in the shrubs, wild flowers, birds and other wild life. A walk through the woods after a snowfall will show all kinds of tracks in the snow. Was it a bird, rabbit, mouse, squirrel, skunk, mink, fox or some unknown animal? Usually the interest in the tracks will be sufficient to ascertain the author of them.

A study of trees will always result in a study of nature as a whole—the most luring, healthful and instructive of all studies. A study of nature's laws carries one back to the beginning of time. Her laws are just in that she has no favorites. From her laws a philosophy can be developed that will be a help in every-day life.

Mr. Charles Lathrop Pack, President of the American Tree Association, has wisely and understandingly said that trees make better citizens.

THE FORESTRY SITUATION

By RALPH F. WILCOX, *Acting State Forester*

THE Department of Conservation, through the Division of Forestry, is charged with the responsibility for restoring the forest resources of Indiana. The inertia of public support to the forestry movement is being overcome and considerable momentum is noticeable.

The Division of Forestry recognizes certain problems of forestry in this state and believes this splendid handbook of Indiana trees offers an opportunity to present an analysis of the present forestry situation.

Indiana has been importing forest products, chiefly lumber since 1885. According to available statistics, a billion board feet of lumber alone were consumed in the state in 1925. Only two hundred million feet were produced locally, making Indiana a net purchaser of eight hundred million feet, or four-fifths of her total consumption. The probable cost of this import was $32,000,000. At least $12,000,000 worth of this lumber bill could have been produced in Indiana to the advantage of local labor and business prosperity.

The question of stopping this $12,000,000 leak in our state pocketbook makes forestry a problem in economics as well as of sentiment for trees.

There are three phases to the problem. In order of their importance they are, protection of our existing forests from fire and grazing, improvement in composition of these forests, and the reforestation of waste or idle land by state acquisition and private enterprise.

Insufficient funds prevent any organized forest fire control. Grazing, which threatens our forests more than fire is discouraged by general publicity work and is completely stopped on about twenty thousand acres of forests which have been classified under the present forest tax exemption law with a prohibitory grazing clause. A program is being carried out to increase the campaign against forest grazing.

As to the improvement of our existing stands the several hundred forest owners whose land has been inspected for classification have been advised about proper forestry practice in their particular woods. Many have followed this advice. Protection and woodland improvement are both accomplished with our present forest tax law. This makes forestry financially attractive by giving forest land a tax assessment of one dollar an acre.

The policy of the Department of Conservation to raise and distribute forest seedlings at cost to Indiana citizens is very important. Seedling orders nearly double each year. Since 1922 the State Nursery has furnished nearly a half million trees for state and private planting. It is expected that a million trees annually will be distributed after 1930.

Since 1903 the state has acquired forty-five hundred acres of forest land at the Clark County State Forest. The abandoned land is planted to experimental forest plantings which in time will earn revenue and afford the scientific research necessary as a background for future forestry practice in the state.

The legislature of 1927 increased the funds for reforestation so that more state forests can be established and the growing of forest seedlings continued on a larger scale.

The services of the Division of Forestry, in so far as a limited personnel permits, are available to all who are interested in the important economic task of forest development. "Common Trees of Indiana" carries the message of trees and their preservation and therefore performs real service in the crusade for more and better forests.

HISTORIC TREES OF INDIANA

By PROF. O. B. CHRISTY, *Muncie State Normal School*

The most famous tree that has stood upon Indiana's soil was the Constitution Elm, located at Corydon, Indiana. Under this tree the Constitution of Indiana was written largely by the founders during the summer of 1816. The old state capitol was built near this tree. The warm weather and the flies were perplexing problems for those constitutional framers, and in order to proceed more rapidly with their duties they gathered near by under the spreading branches of the venerable Elm. Although it was a large tree at that time, it continued to grow and develop for many decades, until its branches reached a spread of one hundred and twenty-four feet in diameter. It was one of Indiana's graceful, beautiful trees as well as becoming known throughout the land as the Constitutional Elm. As the years went by the tree became one of the valuable land marks of the state and the pilgrimages to it became numerous. The state's centennial celebration was held under it in 1916. A few years after this event the tree was attacked by the ozonuim root rot, and all efforts to prolong its life seemed useless. During the spring of 1925 the vitality of the venerable old land mark had become so sapped that only a few leaves put forth from its branches. Before the summer had passed the last signs of life had disappeared and the old monarch bid farewell to the grateful state which it had watched from infancy to a strong and prosperous commonwealth.

In Greene County, Indiana, a mile and a half south of Worthington, was located one of the largest hardwood trees in the United States. This was a sycamore, forty-five feet and three inches in circumference one foot above the ground, and forty-two feet and two inches in circumference five feet above ground. The trunk forked into two symmetrical branches, one nearly nine feet and the other nearly 8 feet in diameter, the east one was twenty-three feet and two inches in circumference. The height of the tree was about one hundred and forty feet, but its spread was about one hundred feet.

This old tree was a reminder of the days when Indiana was like the Oregon, Washington and California forests. It was not widely known until a survey was made by the American Genetic Association, declaring it to be the largest hardwood tree in United States. After this many pilgrimages were made to it. About two years ago it was destroyed by a wind storm.

THE WOODS

WHERE is the boy with spirit so low who upon hearing the name Robin Hood does not long to go to the woods; and where is the girl who upon hearing the name Gene Stratton Porter, does not wish to go out among the beauties of nature. There is only one way for boys and girls to satisfy this longing for the out-of-doors and that is to get ready, go out into the open, and there fill up on the many good things that nature holds ever ready to give to us.

The forest is much more than a grouping of trees. It is a complex community of living things. Associated with the trees are shrubs, wild flowers, ferns, fungi, mosses, and many other plants. And among this varied plant life live the birds, the deer, the rabbits, the snakes, the squirrels, and a long list of other animals. All these living things are a part of the forest. To know the forest fully means that we know these wonderful creatures of a great creation. Blessed is the boy and the girl who can go out into the woods and learn the many interesting and useful lessons that a woods environment makes available.

There is no better place for summer play than among the trees. A tree environment is the best place to seek adventure, to become handy and hard, to see beauty, to think quietly, to walk reverently, to become acquainted with trees, flowers, and ferns, and to study the feathered folks and their furred friends. But we cannot have these privileges unless we care for our forests. It is a sad story, but only too true, that the forests have been swept with haste from the face of the civilized world. Few original forests, except those out of reach, are now left.

It is time to begin a constructive occupancy of the earth. To exist as a Nation, to prosper as a State, and to live as a people, we must have forests. But to have them we must do our part in rebuilding the wrecked and wasted forest areas that now abound everywhere. Forest fires must be stopped. More and better trees must be produced. Existing forests must be handled more wisely. Idle forest land must be put to work. Unless these and many other necessary things are done, forest restoration will not move forward. Our forest slogan should be, "Let's have good forests and get them now." If you want to do an act of kindness—*Protect the Forests.* If you want to do an act of faith—*Plant Forest Trees.* If you want to prove that you are unselfish—*Devote Yourself to the Woods.*

THE TREES

TREES are much more than columns of wood that lift their heads toward the sky. They are living and friendly creatures of a great and wonderful creation. They are glorious nature-made objects, surpassed only by him who walks among them in living beauty and thinking grace. They are the earth's fairest cloak, designed primarily for a life of service and to broadcast happiness and bring comforts to the people of the earth.

The botanist tells us that "a tree is a woody perennial plant having a single main stem commonly exceeding 10 feet in height and usually devoid of branches below, but bearing a crown of branches and foliage at the summit." This may be a good descriptive definition of a tree, but it does not really tell us what trees are. To really know trees we must have a knowledge of more than the length of their trunk, the position of their crown, and the distinctive characteristics of their bark, branches, twigs, buds, leaves, flowers, fruit and other structural features. Trees are living things, and in their lives are more interesting and worthwhile lessons than in their structures. The lives of trees unfold to us beautiful messages and fashion an attitude of tree appreciation without which tree knowledge is soulless.

There is a human as well as a material side to trees. They do so many things that man doeth. To say that they breathe, eat, drink, grow, reproduce, work, and rest is naming only a few of their common functions. They have habits, possess peculiarities, and are adaptive to the environment in which they live. All these attributes place them among the most interesting living things on the face of the earth.

Many a time have I been impressed with the quiet and natural ways of trees and their clean and normal lives. It will ever be to our credit if we too can grow, live and give in the same quietness and naturalness. Then, too, they stand erect, reach high, root deep, and do many good deeds. In many ways the acts of trees are worthy patterns for all of us. If our lives give shelter, pleasantness, and relief as do the trees, they will bring blessings and comforts in growing abundance.

TREES ARE OUR FRIENDS

TREES LIVE TO GIVE. Whenever we look at a tree we should think it has some gifts for us. If the gifts are not wood or food, shade or shelter, they may be one of a long list of other good things we need in our everyday life. Trees are such commonplace things that we often overlook their full service to us. Let us pause just long enough to list a few of the things our tree friends do for us:

Trees make a great contribution to the world's beauty. They pay beauty dividends every day. No place is complete without them. A home without trees is charmless. A road without trees is shadeless. A park without trees is purposeless. A town without trees is cheerless. A country without trees is hopeless.

Trees give us shade and shelter. Beneath their friendly branches man has found refuge from the scorching sun and the angry winds. Today, as in ages past, man seeks the shade of friendly trees to write and enjoy what others have written. Some of the world's greatest thoughts were born in the soft shades of friendly trees. Wherever I see trees shading occupants of benches in our city parks as they shelter the lambs that gather at their feet in the pasture, I think of their friendliness.

Trees help purify the atmosphere. They give out enormous quantities of oxygen through the tiny openings in their leaves. In this way they help make and maintain the pure air we need to keep us alive.

Trees help supply us with wholesome water. The best drinking water comes from the springs that flow from tree-covered watersheds. The pure water that trickles out from among the roots of trees is a great factor in maintaining the health of our people.

Trees safeguard us against drought and protect us against raging floods. They increase the low water runoff in summer and decrease the high water runoff in early spring.

Trees feed, shelter, and give homes to the wild animals of the forest, particularly the birds.

Trees give us rich food. Every boy and girl remembers the delicious chestnuts, walnuts and hickory nuts gathered from trees. The cherries, apples, pears, and the tasty persimmons are also among our favorite fruits.

Trees enrich the soil. Their leaves, upon falling to the ground, are a big factor in maintaining the fertility of our soil. Tree-enriched soils make possible the production of many of the necessary crops of life.

Trees give us a wonderful environment for play. There is no better place to play and rest than among the trees. The lap of a tree is the most comfortable and attractive resting place on the face of the earth. Clean, outdoor play grounds make clean young hearts. The right use of leisure is as vital to good citizenship as the right use of toil.

Trees supply us with wood, which is one of the most necessary things of life. We use it every day. We cannot get along without it. It is essential to our welfare and our life.

Not all the good things that trees do for us have been listed. There are many other ways in which they help us. Enough benefits have been recorded, however, to convince every boy and girl and their teachers, that trees are truly among our best helpers and greatest benefactors.

WITHOUT TREES

WITHOUT TREES this would be a dreary and uncomfortable world. Trees are among nature's best gifts, but they are so common that we do not half appreciate their shade and beauty. We partake of their food and wood as a matter of course. Oft it is with trees as with friends; we do not appreciate their real value until we have lost them. What would we think and how would we feel if some powerful dragon would rush through our streets and about our countryside and over-night destroy all the trees. Then, as never before, would we think of their gifts and realize how intimately they serve us.

Without trees man would be without many indispensable things of life. Without trees the birds, squirrels, and many other wild folks would be homeless. Without trees many

of the choicest wild flowers and ferns would be without a sheltering canopy. Without trees the whole balance of nature would be destroyed and human life imperiled.

Man cannot get along without trees. Apart from their practical value, they make for better manhood and womanhood by inspiring cleaner thoughts and higher ideals. The spiritual value of loving them and being with them is beyond estimate. If we want to continue as a happy people and a prosperous nation we must see to it that we have plenty of thrifty and healthy trees. This is our civic and social duty. Treeless lands are as cheerless as creedless countries are hopeless.

THE PARTS OF A TREE

WHEN we look at a tree we can recognize in its makeup three principal parts. They are the roots, the stem, and the crown. The roots comprise that part of a tree that is usually found below the ground. Our common trees have two general type of root systems, namely, shallow-rooted and tap-rooted. Such trees as the spruces, the hemlocks, and the pines have roots that tend to spread and lie close to the ground. These shallow-rooted trees are, as a rule, not windfirm. Other trees, such as the hickories, the oaks, and the walnuts develop a long taproot. These trees are firmly anchored and rarely uprooted.

Roots have three main lines of work. They anchor the trees to the ground, absorb water from the soil, and transport water to the stem. Without roots, trees could not stand up, and without roots trees would starve for they supply water and food to the stem, branches, twigs, leaves, and other parts of the crown. The principal work of the big roots near the stem is to help the trees stand up, while the fine root hairs at the end of the rootlets are the ones that absorb the water from the soil.

The stem of a tree, also called trunk and bole, is the main axis extending from the roots to the crown, or to the tip in case of an unbranched stem. Tree stems show a wide range in form. They range from long to short, straight to crooked, and from erect to prostrate. An examination of a cross-section of a stem will show three principal parts—bark, wood, and pith. In the central part of the stem is the pith. About it is the wood, which in many trees can be divided into the darker heartwood and the lighter sapwood. Between the wood and the bark is a thin layer known as the cambium. This is the most vital part of a tree, for it is here that all new wood and bark are made up. When a tree

is girdled, the ring of cambium is severed. This kills the tree, for the thin cambium layer is the life-giving part of the stem. The most valuable part of a forest tree is the stem, for in it is produced the wood that is used so extensively by man. The principal functions of the stem are (1) support of the tree crown; (2) transportation of food and water; and (3) storage of food. During the winter months considerable food is stored in the stem for use early in spring when growth starts.

The bark may be divided into two parts—the outer or dry bark, and the inner or living bark. The bark of some trees is very valuable. Some of their products are tannin, cork, dye, and other important commercial products. The bark is very helpful in identifying many of our common trees. The beech can always be recognized by its smooth gray bark, the shagbark hickory by its shaggy bark, and the paper birch by its white bark which peels off in thin papery scales. Other trees also have very distinctive features.

The crown of a tree is made up of many parts such as branches, twigs, buds, leaves, flowers, and fruit. The branches and twigs have many markings, such as lenticels (breathing pores), leaf-scars, and bundle-scars, which are helpful in recognizing trees. The buds of most trees are either opposite or alternate in their arrangement. They are among the best tree features to use for the identification of trees in winter. In summer the leaves have the most distinctive characteristics. In using them in tree identification work, it is helpful to classify them into four major groups: (1) those with opposite leaves; (2) those with alternate leaves; (3) those with simple leaves; and (4) those with compound leaves. If this simple classification method is followed, tree identification becomes easy and interesting.

THE FOOD OF TREES

WE KNOW that trees grow. They get bigger from year to year. In order that they can grow they must feed. The raw material out of which trees make their food comes from two sources—the soil and the air. The rootlets with their many small root-hairs absorb water and with it many food substances are held in solution. During the growing season there is a continuous flow of sap from the roots through the stem to the leaves, where it is converted into nutritious tree food. When the sunlight plays upon the granules of leaf green, tree food is manufactured. To make the food, water is brought from the stem through the leaf stalks into the leaves. Then a complex chemical process takes

place. This is the reason why leaves have been called the laboratory of the trees. The principal product derived from this process, known by the technical name of photo-synthesis, is starch. As rapidly as the food is manufactured in the leaves, it makes its way down through the cells of the twigs, branches, and the stem. A continuous stream of nutritious sap is moving downward. The thin layer of cambium cells which encircle the tree then draws upon this food supply to build up new wood, bark, and other tree tissue. When there is an excess of food material it is stored in the roots, stems, branches, and twigs for later use.

It is interesting to know that in making the starch, oxygen is a by-product. This explains why it is healthy to have green growing plants about us in daytime. Leaves prepare food only in daytime, and their output is the greatest in full sunlight, and is almost negligible during dark nights. This is the reason why we find the most luxuriant tree growth in moist, sunny, and warm regions. It is also worth knowing that during the periods of the year when the leaves are not manufacturing food, the trees live upon a food supply stored up during the long and light days of summer time.

THE ENEMIES OF TREES

TREES have many enemies. They are fighting for their lives all the time. There are 200,000 known kinds of insects that attack trees. It is estimated that caterpillars, beetles, borers, and other insects cause a loss of one hundred million dollars every year. Birds help us a lot in holding the insects in check. But they cannot wage war unaided. We must take a hand in this serious insect problem.

When we think of tree enemies we must not overlook tree diseases, such as blights, rusts, and rots. They too are a serious menace. These diseases affect the tree's health, just as human diseases affect our health. Not many years ago the chestnut was the foremost tree in many eastern states. Now middle-size to large chestnut trees are very scarce. There is a good reason for this. In 1904 the deadly chestnut blight was imported from China. In twenty years it travelled over practically the entire range of the chestnut, killing trees by the millions. So far no practical method of control has been found. As a result of its destructive work the chestnut tree is rapidly vanishing.

There are thousands of other tree diseases continuously at work holding back the growth of trees. And decay is always hard at work destroying the wood that the trees have built up. Trees must be kept strong and healthy so they can

throw off disease. To accomplish this we must keep our forests clean. Unless we do this we will pay an ever increasing price for lumber, and later on we will have no more forests to draw on.

TWO great enemies of our trees are fire and grazing. Grazing is a greater menace to the perpetuation of the forests in Indiana than fire. The carelessness of man is responsible for nearly all forest fires. Failure of forest owners to realize the evils of grazing and to protect their wood crop from cattle as they would protect an agricultural crop is rapidly destroying our remaining forests of the central hardwood region. With these things in mind let us consider a few of the things done by forest fires and grazing.

FOREST FIRES

1. Forest fires destroy the beauty of the woodlands.
2. They destroy animal and plant life.
3. They destroy tree seeds and seedlings that would grow into valuable stands of timber.
4. They kill an enormous number of promising young, middle-aged and old trees.
5. They consume large quantities of felled timber and other forest products.
6. They destroy the leaf litter on the forest floor.
7. They impoverish the forest soil. Many bare and sterile hillsides are the result of repeated forest fires.
8. Forest fires open the way for the destructive work of insects, fungi, erosion, floods, and drought.
9. They frequently destroy buildings, crops, and fences, and occasionally homes.
10. They may also be responsible for the loss of human lives.

There is no end to the damage forest fires do. They bring no good to anyone. In their wake we find waste and impoverishment. To prove our citizenship we must begin right now to battle this red foe.

FOREST GRAZING

1. Forest grazing destroys young forest trees.
2. It destroys the reproduction of the forest.
3. It deforms young trees which are not actually eaten.
4. It retards the growth rate by packing the forest soil.
5. It thins the woods and exposes the soil to drought.
6. It destroys a profitable wood crop to afford little or no pasture. Leaves of young trees have little or no actual food value.

7. It makes an unnatural forest condition and ruins the native beauty of a dense woods.
8. It opens the forest to sunlight and invites destruction by insects.

Forest grazing unless checked will destroy practically all the woodlots in Indiana. Like fire, continued grazing in a woods prevents perpetuation of the forest after logging by destroying young trees. It is not the increasing death rate which threatens a race so much as a decreasing birth rate. The natural birth rate of a hardwood forest is prolific and future forests must be insured by protecting these young trees. Grazing destroys them.

Every boy and girl should become a tree protector, and it would be well for the grown-ups to turn a heedful ear to the lessons of forest protection. If we want to continue as a nation of wood users we must become a nation of wood growers. To do this effectively we must wage a constant warfare against the foes of our friends—the trees. PREVENT FOREST FIRES AND GRAZING—IT PAYS is a slogan that should be repeated over and over again until it becomes a household word, for everybody loses when our forests are destroyed.

WHAT FORESTRY IS

FORESTRY is the art of handling forest land in such a way that it will be of the greatest service to man. This implies a good working knowledge of forest trees, for they are the principal members in the make-up of the forest. A correct working knowledge of trees will go far to guarantee a sound program of forest conservation, which is one of the most vital problems confronting the people of our state.

WHEN TREES GROW

MOST PEOPLE believe that trees grow from early spring when the leaves begin to come out until the first frost when they start to show their autumn color. That this widespread belief is not correct is now known. For instance in the latitude of southern Pennsylvania the native forest trees make 90 per cent of their height growth in 40 days of spring and early summer.

Not all trees begin to grow at the same time. Some begin early in spring, while others delay starting their growth until late April or early May. The Wild Black Cherry starts about the first of April, while the Tulip Tree or Yellow Poplar does not begin until late in April, and the Norway Spruce waits until early in May. The fact that the different trees start their growth at different times may not seem strange, but where is the person who is not amazed to learn

that the Sweet Buckeye has its whole height growth for the season completed in some regions by the tenth of May. For ten years the author has watched different specimens of this tree in Pennsylvania, and with no single exception all the height growth for the year was finished by May 10. This means that the height growth took place in 35 days in springtime.

An even greater revelation of this growth study was the fact that growth takes place by leaps and bounds. Periods of rest often occur between periods of growth. These rest periods may be long or they may be short. In this respect trees are not different from boys and girls who are willing to have long rest periods scattered freely among their working hours.

Several years ago, the author tagged a chestnut oak tree and measured its growth carefully. It began growing on April 17, and grew regularly until May 23. Then it began a rest period of 32 days. On June 24 it started to grow again and continued until July 13. If you figure out this tree's height growth you will find that at the beginning of the season it grew for 36 days, then rested for 32 days, and thereafter grew again for 20 days. During the first growth period it grew 10 inches—an average of about one-third of an inch per day, and during the second period 13½ inches—

This was one of the most interesting tree studies ever undertaken by the writer of this handbook. He hopes that many boys and girls will continue this study and help add to our tree knowledge.

DO TREES BREATHE?

THAT TREES BREATHE is a firmly established scientific fact. Year after year, during night and day, in summer and in winter, trees inhale oxygen and exhale carbon dioxide. Trees breathe from the time they are seeds until they die.

The leaves are often called the lungs of a tree. It is true most of the oxygen enters through little openings on the leaves. Most of these tiny openings are on the lower leaf surfaces. They have been given the technical name of *stomata*. On the leaves of some trees there have been counted as many as 100,000 openings on a square inch. These little doorways open to let in oxygen and to let out carbon dioxide. During the day trees also take in carbon dioxide and give off oxygen through the small leaf openings. This is a part of the process of food manufacture known under the scientific name of photosynthesis. Not all the oxygen is

inhaled through the leaves, for some is taken in through little openings on the twigs known as lenticels. They can readily be recognized as pale to brown dots. On some trees, such as the birches, cherries, and sumacs, they are large and easily visible to the naked eye, while in other trees they are small and obscure.

Trees also transpire, that is, give off water. We may call it perspiring or "sweating." When an excess amount of water is delivered to the leaves it is given off through small stomata, the same openings through which the trees breathe. This excess water is given off as an invisible vapor. Scientists have estimated that a big oak may transpire as much as 150 gallons of water during a single day of summer.

HOW TO TELL THE AGE OF TREES

SOME TREES reach a great size and become very old, while others remain small and die young. A definite age limit cannot be set for each kind of tree, but for general use our common trees may be said to be long-lived or short-lived. Of our native trees, the White Oak, Button-wood, White Pine, and Hemlock are long-lived trees, and the Poplars, Willows, some Cherries, and a few Oaks are short-lived. Some of the Sequoias of California exceed the 3,000-year an average of more than three-fifths of an inch per day. mark, and the big Cypress Tree of Tule growing in the state of Oaxaca, Mexico, has been estimated from 4,500 to 5,000 years, and is sometimes spoken of as "the oldest living thing in the World."

It is not always easy to tell the age of a tree. Sometimes accurate written records are available. In other cases it may be possible to get a reliable verbal statement from one who knows exactly when a specific tree or a group of them was planted. In the absence of accurate records or reliable statements, the best way to tell the age of a tree is to count the annual rings on the cross section of the stem near the ground, and add to this count the number of years it took the tree to grow to the height at which the count was made. In case of a felled tree, the stump section is a good place to make the count. The number of rings on the top section, plus the number of years it took the tree to grow to the height of the stump, gives the total age of the tree, for each ring usually represents a year's growth. To determine the age of standing trees an instrument is in use known as an increment borer. By means of this borer a small core about ⅛ of an inch in diameter is taken from the stem, and rings thereon are counted. The results furnish a good basis for estimating

the age of trees. It has proved very valuable to foresters in studying the growth of standing forest trees.

There is another method that is helpful in telling the age of such trees as White Pine, which develop their lateral branches in distinct whorls or stories one above another. The distance between these whorls of branches normally represents a year's growth. If the branches have fallen off or been removed, one can often see the circle of branch scars on the stems. By counting the number of sections between these separate stories of branches one can estimate very closely the age of the trees in question. The age of young hardwood trees can also be told by counting the rings of terminal bud-scale scars upon the twigs and the slender stems. The portion of the twigs from the tip to the first ring of bud-scale scars is one year's growth. The distance between the first and second rings is another year, and so on as far down the stem as these scars remain visible.

Telling the age of trees is fascinating pastime. After you have been successful in telling the age of a few trees you will find yourself questioning the age of others. You will not have gone far in your study of the age of trees until you will be convinced that the age of young trees like that of children is far more easy to tell than that of grown-up trees.

WHERE TO STUDY TREES

THE best place to study trees is right where you are—if a tree happens to be near. If you are in a city and it is not convenient for you to go out into the woods, you can study the trees on the home grounds, along the streets, or in the parks. Do not forget to get acquainted with the tree that may stand near your front door. Other satisfactory places are fence rows, stream banks, waste places, abandoned fields, and woodlots. But the best place of all to get an acquaintance with trees is out in the great forest stretches on the mountain tops and in mountain valleys. Out there the trees are so plentiful and look so natural.

Then too we must not forget that many trees have been planted in all parts of the State. Among these planted trees are some very rare and interesting specimens. They can be found on private estates, public parks, arboretums, and forest plantations. A real tree treat is available to those who will journey to these great tree places.

Each year an increasing number of people go a-camping. When in camp one has unexcelled opportunities to study the native trees. The author has visited many places in

Indiana. At each were found from 40 to 75 different native trees, and at some a considerable number of introduced trees have been planted. To name and list the trees on and about the camp ground is not only a pleasant pastime but also a profitable undertaking. Rich, indeed, is the boy or girl who can say "I can name all the trees about our camp." "I have named and listed all the trees between Oak lane and Cedarville," "Shoemaker's island is a tree paradise—I found 57 different species there." To know all the trees on a particular plot of ground is an achievement of merit for any boy or girl, and even grown-up folk who can name the trees that help to make our land so beautiful, have a right to feel proud of their accomplishment.

HOW TO STUDY TREES

THE FIRST THING one usually wants to know about a tree is its name. Each tree has two kinds of names—the common name and the scientific name. One of our best known trees has the common name of WHITE OAK. Its scientific name is *Quercus alba.* Some trees have five to ten or more common names. Whoever knows the common and scientific names of a tree has mastered the first step in tree identification.

There are a number of common ways to get acquainted with trees. Some students are fortunate enough to have good teachers who know the trees. When this is true, tree identification is very easy. But there are other less fortunate ones who must study them from books. The study of trees is one of the purest delights of outdoor life. It is so pleasant, so fascinating, and so stimulating that it becomes a pastime of rare delight. To know trees is to love and protect them. In teaching our boys and girls about trees we will place in their possession an unafraid attitude towards the out-of-doors and thus instil into them the duty of preserving tree homes for our cheery bird friends "Whose habitations in the treetops e'en are half-way houses on the road to Heaven."

Fortunate are the boys and the girls who can tell the names of trees, know the quality of their fruit, the fragrance of their flowers, the form of their leaves, the flavor of their twigs, the color of the bark, and the properties of their wood: especially whether the wood is tough or brittle, easy or hard to chop and split into firewood.

EXCELLENT BOOKS ON TREE AND SHRUBS OF INDIANA

YOUR attention is called to two books, "Trees of Indiana" and "Shrubs of Indiana," by Charles C. Deam, State Forester. They are published and distributed at cost by the Division of Forestry of the Department of Conservation, Indianapolis. Both books are complete in scientific detail. The botanical characteristics of each species are technically accurate.

The species are arranged in the order of development according to family, genera, and species. Each species is treated in order as to botanical characteristics, distribution, and remarks. The books are bound and printed on good quality paper, with a list of illustrations and index. "Trees of Indiana" contains one hundred and thirty-three 5x7 illustrations. "Shrubs of Indiana" contains one hundred and forty-six 5x7 illustrations. These books are recommended for school teachers, botany students, farmers, nurserymen and horticulturists who might desire greater scientific detail than is possible in this handbook: "Common Trees of Indiana."

* * * * * *

"He that planteth a tree is a servant of God. He provideth a kindness for many generations, and faces that he hath not seen shall bless him."

HENRY VAN DYKE.

* * * * * *

"I have written many verses, but the best poems I have produced are the trees I planted on the hillside."

OLIVER WENDELL HOLMES.

* * * * * *

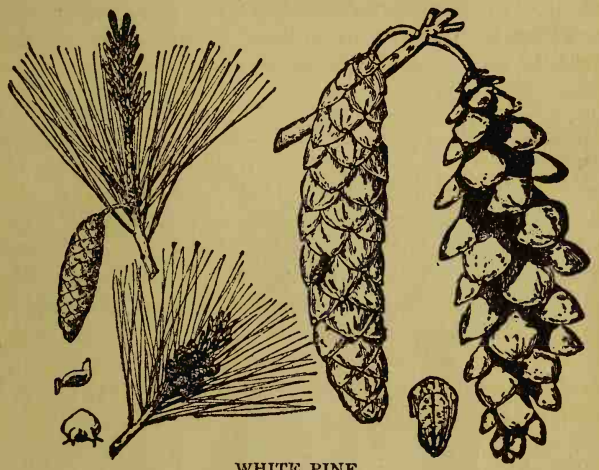
"Under this oak I love to sit and hear all the things which its leaves have to tell. No printed leaves have more treasures in history or of literature to those who know how to listen."

HENRY WARD BEECHER.

WHITE PINE

Pinus Strobus, Linnaeus

THERE is no tree in the world that surpasses the White Pine in beauty, stateliness, individuality, and usefulness. It is the prince of North American trees. Reliable records show that the first American house was built of White Pine.



WHITE PINE
One-third natural size.

It is the only evergreen tree native to eastern North America that has soft, slender, flexible, straight, bluish-green leaves grouped in clusters of five. They are 3 to 5 inches long, adn persist for 2 years.

The cones are 5 to 10 inches long, short-stalked, narrowly cylindrical, rarely hang long on the trees. The cone-scales are thin, flat and without spines or prickles.

The trunk is straight, when grown in dense stands is clear of branches for many feet. The lateral branches occur in whorls of 3 to 7 arranged in horizontal layers. Upon falling they leave distinct circles of branch-scars.

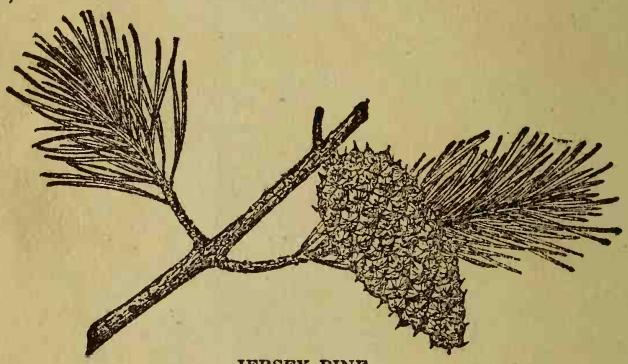
The wood is soft, light brown, straight-grained, easily worked. It is used for a wider range of purposes than any American wood.

The White Pine is native from Newfoundland west to Manitoba and Minnesota south to Iowa, Pennsylvania and Kentucky and along the mountains to Georgia. In Indiana it is local on the dunes about Lake Michigan. A few trees occur along Big Pine, Little Pine, Rock and Kickapoo creeks in Warren county; also along Big Shawnee and Bear creeks in Fountain county, and along Sugar Creek in Montgomery county. White Pine is one of the trees recommended for reforesting abandoned fields in Indiana.

JERSEY PINE

Pinus virginiana, Miller

THE Jersey Pine is a pioneer tree. It is among the first trees to march out and reclaim abandoned fields and other waste places. It is unfortunate in its common name, which implies that it is inferior and undesirable. This is incorrect, for each year its wood is used more extensively for pulp, shipping crates, and general construction work, and locally it is used as a Christmas tree.



JERSEY PINE
One-half natural size.

The leaves occur in pairs. They are 1½ to 3 inches long, twisted, spread widely from each other.

The cones are narrow, conical, sharp-pointed, 2 to 3 inches long, persist for several years. The cone-scales bear slender prickles.

The twigs are smooth, purplish, tough, usually wavy. On older trunks the bark peels off in thin scales, giving a ragged appearance.

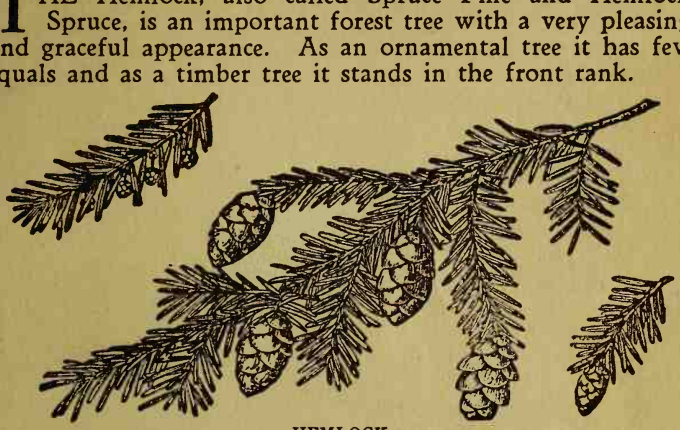
The Jersey Pine is found from southeastern New York, central New Jersey, and north-central Pennsylvania south to Georgia and Alabama and west to Indiana and Texas. In Indiana it is confined to the knob area of Floyd, Clark and Scott counties, and the southeastern part of Washington county. Whenever this tree grows near an abandoned field it soon reforests it. This makes it a valuable tree in reforesting the "knob" area of Indiana.

The Jersey Pine does not become a big forest tree. It usually reaches a height of 30 to 70 feet and a diameter of 18 inches. The largest specimen found in the northern part of its range was 82 feet high and 28 inches in diameter. Another pine found on the dunes about Lake Michigan is the Gray Pine or Jack Pine, Pinus Banksiana, Lambert. It has short leaves about 1¼ inches long and unarmed cone-scales.

HEMLOCK

Tsuga canadensis, (L.) Carriere

THE Hemlock, also called Spruce Pine and Hemlock Spruce, is an important forest tree with a very pleasing and graceful appearance. As an ornamental tree it has few equals and as a timber tree it stands in the front rank.



HEMLOCK
One-half natural size.

The leaves are flat, ½ of an inch long, rounded or notched at apex, dark green and glossy above, with two white lines on lower surface, joined to the twigs by short and slender woody stalks. They are spirally arranged, but appear as if arranged in two flat rows alongside the twigs. A third row of small leaves point forward on the top of the twigs.

The cones are oblong, light brown, ¾ of an inch long, short-stalked. They often persist throughout the winter. The cone-scales are about as wide as long.

The outer bark is reddish-brown and scaly; the inner is cinnamon red. If one takes a pocket knife and bores into the inner bark and finds it cinnamon red he has a positive distinguishing characteristic of this tree. The twigs are very slender, grayish-brown, at first hairy, and rough when needle-leaves are shed.

The wood is hard, weak, brittle, liable to splinter and difficult to work. It is used for coarse lumber, boxes, crates and pulp, and the bark is rich in tannin.

The Hemlock is found from Nova Scotia to Minnesota and south to New Jersey and Pennsylvania and along the mountains to Alabama. It occurs only in a few places in Indiana, being found on cool slopes of high bluffs on the south side of streams. It is reported from Brown, Putnam, Parke, Montgomery, Owen, Jackson, Jennings, Floyd, Clark, Lawrence and Crawford counties. It is a shade-loving tree and not very windfirm. It usually reaches a height of 60 to 80 feet, but may become 100 feet high and 4 feet in diameter.

AMERICAN LARCH

Larix laricina (Du Roi) Koch

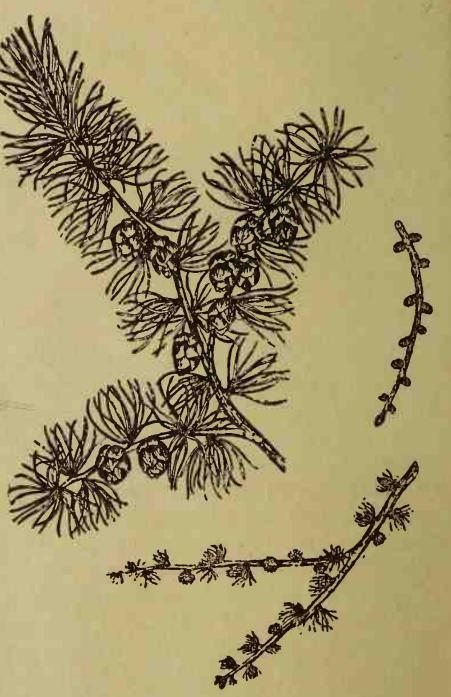
THE American Larch, commonly called Tamarack, is a northern tree, which sheds all its leaves in autumn.

The leaves are flat, soft, slender and about one inch long. On the twigs of last seasons growth they occur singly; on the spurs of older twigs in clusters of ten or more.

The cones are among the smallest of any American tree. They average two-fifths of an inch in length, bear about 12 scales, and often persist for many years.

The glossy brown twigs are without foliage in winter and covered with numerous stubby spurs. The bark on older trunks is reddish-brown and breaks up into small roundish scales.

The wood is heavy, hard, and durable in contact with the soil. It is used for posts, poles, ties and in ship building.



AMERICAN LARCH
One-half natural size.

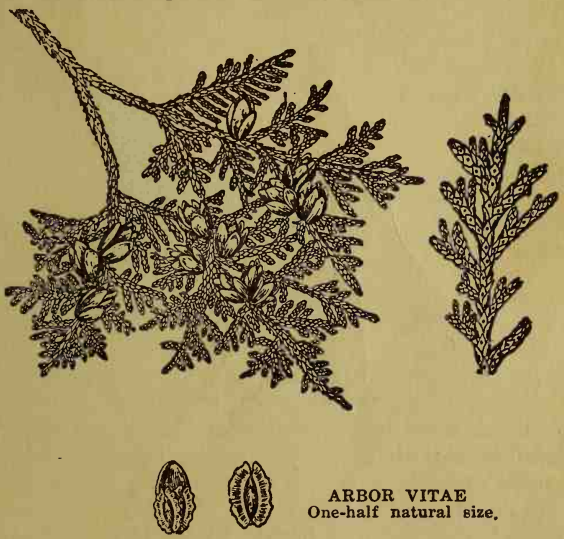
The American Larch is found from Newfoundland south to northern New Jersey and Pennsylvania and west to Minnesota and through British Columbia to Alaska. It is found in bogs, on the border of rivers and lakes in northern Indiana. The most southern station is in Allen county. It is fast becoming extinct due to dredging of bogs. It rarely exceeds 50 feet in height and 2 feet in diameter.

The European Larch (Larix decidua, Mill.) has been planted as a specimen tree in Indiana and is recommended for forest planting on well-drained gravelly soil. It has larger and usually erect cones, stouter and yellower twigs, and longer and more abundant leaves than the American Larch.

ARBOR VITAE

Thuja occidentalis, Linnaeus

THE Arbor Vitae, also called White Cedar and Cedar, is one of the most widely planted evergreen trees in North America. It develops a conical symmetrical crown and usually reaches a height of 25 to 50 feet.



ARBOR VITAE
One-half natural size.

The leaves are scale-like, ⅛ of an inch long, closely overlap one another, aromatic when crushed, marked with glandular dots. They are arranged in pairs. Each succeeding pair alternates with the next pair.

The cones are oblong, ½ of an inch long, with 6 to 12 blunt-pointed, reddish-brown scales. The trunk usually divides near the base. The bark is grayish to reddish-brown, usually furrowed, and peels off into thin shred-like strips.

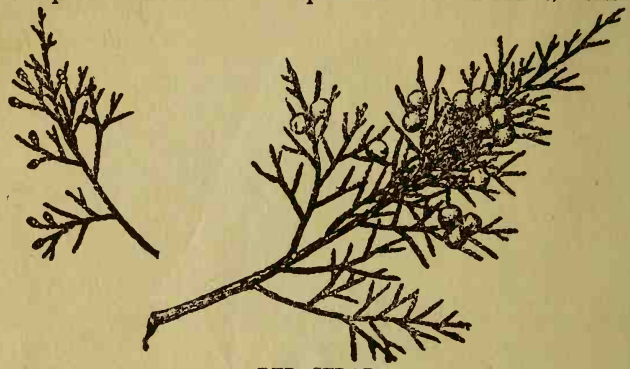
The Arbor Vitae is found from southern Labrador west to Manitoba and Minnesota and south to North Carolina. In Indiana it is now native only northwest of Mineral Springs in Porter county. Formerly it occurred in Lake county. It has been planted widely for ornamental uses. More than 50 garden varieties of Arbor Vitae are known. Some of them, such as White Arbor Vitae and the Golden Arbor Vitae, are distinguished by their color. Others are recognized by their form. Among the commonest forms are the pyramidal, the globose, the juvenile, and the pendulous. Closely related to the native Arbor Vitae is the Oriental Arbor Vitae—Thuja orientalis, Linnaeus. This tree has been planted extensively throughout eastern North America.

RED CEDAR

Juniperus virginiana, Linnaeus

RED CEDAR is a common household word. In recent years the "red cedar chest" has won its way to a special place in the modern home.

The leaves are of two kinds, namely scale-shaped and awl-shaped. The scale-shaped are commonest, one-six-



RED CEDAR
One-half natural size.

teenth of an inch long, closely appressed to twigs, four ranked. The awl-shaped are narrow, sharp-pointed, spreading, do not overlap, occur in 2's and 3's.

The fruit is a dark blue berry about ¼ of an inch in diameter. Berries are freely eaten by birds.

The bark is very thin, reddish-brown, shallowly furrowed, peels off in long shred-like strips.

The wood is soft, strong, of even texture, works easily. The heartwood is distinctly red and the sapwood white. This color combination and its pronounced fragrance, supposed to ward off moth and other insects, account for its wide use for clothes chests, closets and for interior woodwork. It is also used extensively for fence posts, lead pencils and cigar boxes.

The Red Cedar, also called Cedar, and Juniper, is found from Nova Scotia to South Dakota south to Florida and Texas. It is found throughout Indiana, but sparingly in the northern part. It is commonest on unglaciated limestone soil. This tree grows slowly, needs plenty of sunlight, and rarely exceeds 50 feet in height and 18 inches in diameter in Indiana. It has a distinctive narrow conical crown when growing in the open.

The Common Juniper—Juniperus communis, Linnaeus—is closely related to the Red Cedar. It is frequent along Lake Michigan and found inland in Noble, St. Joseph and Steuben counties. Its awl-shaped leaves occur regularly in 3's and do not extend along the twigs.

BLACK WILLOW

Salix nigra, Marshall

THE Black Willow reaches the largest size and has the widest distribution of any native American Willow. It is the only native willow of timber size, sometimes reaching a height of 80 feet and a diameter of 4 feet.

It can always be distinguished by its simple, alternate, long, narrow, sharp-pointed leaves, 3 to 5 inches long. At the base of the short leaf-stalk round leaf-like appendages often clasp the twigs.

BLACK WILLOW
One-fourth natural size, except 2, 4, 6 and 8 which are enlarged.

The flowers are of two different kinds. Both are arranged in short stubby spikes. The pollen-bearing and seed-producing always occur on different trees. The seeds are minute, bear dense tufts of long silky down, occur in large numbers in small capsules on drooping tassels.

The bark varies from light brown to dark brown and black. On old trunks it becomes furrowed and peels off in scales. The branches are slender, brittle, somewhat drooping. The buds are sharp-pointed, ½ of an inch long, covered by a single reddish-brown scale.

The wood is pale reddish-brown, used chiefly in boxes, excelsior, charcoal, pulp, artificial limbs.

The Black Willow occurs from New Brunswick to Florida, west to the Dakotas and southern Mexico. It is found throughout Indiana, but reaches its largest size in the lower Wabash bottoms. One usually finds it in wet places, but it will grow on dry situations.

PUSSY WILLOW

Salix discolor, Muhl.

THE Pussy Willow, probably more than any other tree, tells the people of both city and country, when spring is here. During a brief period of spring it gives the chief touch of beauty to the landscape through its fine display of yellow blossoms that are visited by thousands of bees.

The leaves are simple, alternate, elliptic, 3 to 5 inches long, bright green above and silvery white below. A distinctive feature of the leaves is the wavy margins with coarse teeth.

PUSSY WILLOW
One-fourth natural size.

The flowers are of two kinds. Both are arranged in short, stubby spikes. The pollen-bearing and the seed-producing always occur on different trees. They appear before the leaves and tell us when spring is coming. The seeds are produced in large numbers in hairy long-beaked light-brown capsules.

The bark is thin, smooth, greenish, rarely scaly. The stout branchlets are marked with orange-colored breathing pores. The buds are alternate, ¼ of an inch long, duck-bill like, flattened on inside, dark reddish purple. The wood is similar to that of Black Willow.

The Pussy Willow is found in moist meadows or marshes and along banks of streams and in other wet places from Nova Scotia south to Delaware and west to Manitoba and Missouri. It is common in northern Indiana. It is rare or absent in the unglaciated area of south-central counties. It rarely exceeds 25 feet in height and is of considerable value in landscape work, especially along water courses.

WIDELY INTRODUCED WILLOWS

THREE Willows have been widely introduced into Indiana. They are the Weeping Willow, the White Willow, and the Crack Willow.

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The Weeping Willow (Salix babylonica, Linnaeus), a native of Asia, was introduced into the United States in 1702 by a famous botanist named Tournefort. Sometimes this tree is called Napoleon Willow because of its association with the great French general during his exile. It has been planted widely in New Jersey. This tree can always be distinguished by its weeping habit. Its long drooping branches are distinctive, and when young they are tough and pliable, but later become brittle. Its leaves are simple, alternate, 4 to 7 inches long; in shape they resemble the Black Willow and in color those of the White Willow.

The White Willow (Salix alba, Linnaeus), a native of Europe, was brought to America by the early settlers. It is now found from the Atlantic to the Pacific and is given planting preference where erosion and landslides are to be stopped. It is found locally throughout Indiana as an ornamental tree. In some places it has escaped cultivation. This tree sometimes reaches a height of 70 feet and a diameter of 4 feet. The leaves are simple, alternate, 2 to 4 inches long, one-third to two-fifths of an inch wide, finely toothed along edge. When young the leaves are pale green and hairy on both sides, but when mature they are distinctly white only on the lower surface, whence the name White Willow.

The Crack Willow (Salix fragilis, Linnaeus), a native of Europe and northern Asia, has been planted widely in America, especially in the prairie states. It is found locally in Indiana, particularly about the earlier settlements. It is readily distinguished from the White Willow by its yellowish-green twigs and larger leaves, which are 3 to 6 inches long, ½ to 1 inch wide, coarsely toothed along margin. The branches are so brittle that they crack off easily in a slight breeze, whence the appropriate name Crack Willow. After a storm the ground beneath this tree is often completely covered with twigs and branches.

QUAKING ASPEN

Populus tremuloides, Michaux

THE Quaking Aspen is also called Trembling Aspen and Small-toothed Aspen. The air must be remarkably still if the foliage is not quaking or trembling.

The leaves are simple, alternate, 1½ to 2½ inches long, nearly round, finely toothed on margin, with leaf-stalks flattened laterally.

The flowers appear early in the spring. Pollen-bearing and seed-producing occur on different trees. Both are arranged in slender drooping tassels.

The fruit is a 2-valved capsule containing small seeds with tufts of fine hairs.

The bark is white or grayish to yellowish-green; on old trunks becomes rough and black. The twigs are smooth, shiny, reddish-brown. The buds are narrow, conical, sharp-pointed, smooth, shiny, appear varnished, covered with 6 to 7 reddish-brown scales.

QUAKING ASPEN
One-fourth natural size, except enlarged flowers and twigs.

The wood is soft, weak, not durable, white to light brown, used for paper pulp, boxes, crates, and wooden dishes.

The Quaking Aspen is the most widely distributed tree in North America. It is a transcontinental tree extending from Newfoundland to Alaska and south to New Jersey, Kentucky, Mexico and California. It is frequent in the lake region of northern Indiana, becoming rarer farther south and absent in the unglaciated area.

A closely related tree is the Large-toothed Aspen (Populus grandidentata). It is found with the Quaking Aspen and on some of the hills of southern Indiana. Its leaves are larger and more coarsely toothed, and its buds are stout, broad-pointed and covered with a flour-like coating. co

COTTONWOOD

Populus deltoides, Marshall

THE Cottonwood, also called Carolina Poplar, is one of the largest trees of Indiana.

The leaves are simple, alternate, broadly triangular, square at base, 3 to 5 inches long, with long and laterally flattened leaf-stalks.

The flowers appear before the leaves. Pollen-bearing and seed-producing occur on different trees. Both are arranged in drooping tassels.

The fruit is a 3 to 4-valved capsule arranged in drooping tassels and containing numerous small seeds with tufts of fine hairs.

The bark on young trunks is smooth and greenish-yellow, on old trunks becomes ashy-gray to dark brown and deep furrowed. The lateral branches take an upright position. The twigs are stout, yellowish, marked with grayish dots, have prominent ridges below leaf-scars. The buds are large, resinous, glossy, chestnut-brown. The terminal bud is often 5-angled. The wood is soft, not durable, white to brown. Used for paper pulp, boxes and crates.

COTTONWOOD
One-fourth natural size except enlarged flowers and twig.

The Cottonwood is found from Quebec south to Florida and west to the Rocky Mountains. This tree is found throughout Indiana in low places.

The introduced Lombardy Poplar, a native of southern Europe, was formerly planted as a street tree, but is now prohibited because its roots penetrate sewers. It can be recognized by its narrow and high crown with almost vertical lateral branches. The Swamp Cottonwood with large leaves, with hairy lower surfaces and round leaf-stalks is common in southwestern Indiana.

BLACK WALNUT

Juglans nigra, Linnaeus

THE Black Walnut is more fortunate than many trees in that it has only a few common names. Throughout its entire range of 650,000 square miles it is called Walnut, Black Walnut or Walnut-tree.

BLACK WALNUT

Leaf and fruit, one-fifth natural size. Twig, three-fourths natural size.

The leaves are alternate, compound, with 13 to 23 leaflets. Leaflets are 3 to 4 inches long, sharp-pointed, toothed along margin, stalkless.

The flowers are of two kinds. Both occur on same tree. The pollen-bearing occur in unbranched drooping tassels. The nut-producing occur in few-flowered clusters on the new growth.

The fruit is a round furrowed nut, 1 to 2 inches in diameter with a green non-splitting fleshy husk which turns black when mature.

The bark is thick, rough, furrowed, dark brown to grayish-black. The twigs are stout, grayish-brown, bitter to taste, contain gray to light brown chambered pith. The buds are covered with downy scales. Terminal bud is as long as wide. Lateral buds are smaller.

The wood is rich dark brown, hard, strong, splits easily, very durable. Used in furniture, interior finishings, sewing machines and gun stocks.

The Black Walnut is found from southern New England to Minnesota and south to Florida. This is a common to frequent tree throughout Indiana. It has been extensively planted by man and squirrels. Few farms are without it. It is recommended for planting in woodlots. Its wood has always commanded high prices, and its nuts are among the best.

BUTTERNUT

Juglans cinerea, Linnaeus

THE Butternut, also called White Walnut, is a close kin of the Black Walnut.

The leaves are alternate, compound, with 13 to 23 leaflets.

The flowers are of two kinds. The pollen-bearing occur in unbranched drooping clusters. The nut-producing occur in few-flowered clusters on new growth.

The fruit is an elongated nut with a hairy, sticky, non-splitting husk. The nut is 4-ribbed, pointed at one end, sharply furrowed over entire surface, and contains sweet, oily and edible nut.

The bark is gray to ashy-white, separates into wide flat ridges. The twigs are stout, greenish-gray, often downy, contain dark-brown chambered pith. The buds are covered with dense pale down. Terminal bud is ½ to ¾ of an inch long, flattened, blunt-pointed, longer than wide. Lateral flower buds are pineapple-like, often placed one above another.

BUTTERNUT
One-fourth natural size, except 3 and 4 which are enlarged and 7, 8, 10, 11 and 12, natural size.

The wood is soft, not strong, light-brown. Used in furniture, interior finishing, and chests.

The Butternut is found from New Brunswick to Minnesota, south to Delaware and Arkansas and along mountains to Georgia. This is an infrequent tree throughout Indiana. It usually occurs alone, and grows best on moist soil in the northwestern part of the State. It rarely exceeds 50 feet in height and 2 feet in diameter.

SHELLBARK HICKORY

Carya ovata, (Miller) K. Koch

THE Shellbark Hickory, also called Shagbark Hickory, is the best known of all the hickories. It produces the best nuts and has the most distinctive features of all the native hickories.

The leaves are alternate, 8 to 14 inches long, compound, with 5, rarely 7, leaflets. The three upper leaflets are the largest, the pair nearest the base is usually only about one-half the size of the terminal ones.

The flowers are similar to those of the other hickories.

The fruit is round, 1 to 1½ inches long, with husk that splits into 4 sections from apex to base. The nuts are smooth, white, 4-angled, pointed at the ends. The kernel is large and sweet.

The bark is smooth and light gray on young stems. On old trunks it becomes distinctly shaggy. The twigs are reddish-brown to gray, covered with numerous light dots, usually hairy. The buds are egg-shaped, blunt-pointed, about three-fifths of an inch long, covered with about 10 bud-scales.

SHELLBARK HICKORY
One-fourth natural size, except 7 which is natural size, and 8 slightly enlarged.

The wood is very heavy, hard, strong, tough, elastic, close-grained. Used chiefly for handles and vehicles.

The Shellbark Hickory is found from Quebec to Minnesota, south to Florida and Texas. It occurs in all parts of Indiana, mostly in rich moist soil. It is a valuable tree in the woodlots. In the second growth forests it usually reaches a height of 90 feet and a diameter of 15 to 30 inches.

BIG SHELLBARK HICKORY

Carya laciniosa, (Mx. f.) Loudon

THE Big Shellbark Hickory, also called Bull Nut, is a very important forest tree in Indiana on account of the valuable wood and the delicious nuts its produces.

The leaves are alternate, compound with 5 to 9 leaflets. The prevailing number of leaflets is 7. They are usually hairy beneath until maturity. The leaf-stalks often persist through the winter. The fruit is a dull white nut, 1 to 1½ inches long, usually rounded at base and pointed at apex, covered with thick husks that split in 4 valves, and contains large sweet kernel.

The bark on young trees is tight, begins to scale when 4 to 8 inches in diameter; on old trees shags off in long narrow strips. The twigs are stout, usually light orange brown, at first hairy but become smooth. The buds and wood are similar to those of the Shellbark Hickory.

BIG SHELLBARK HICKORY

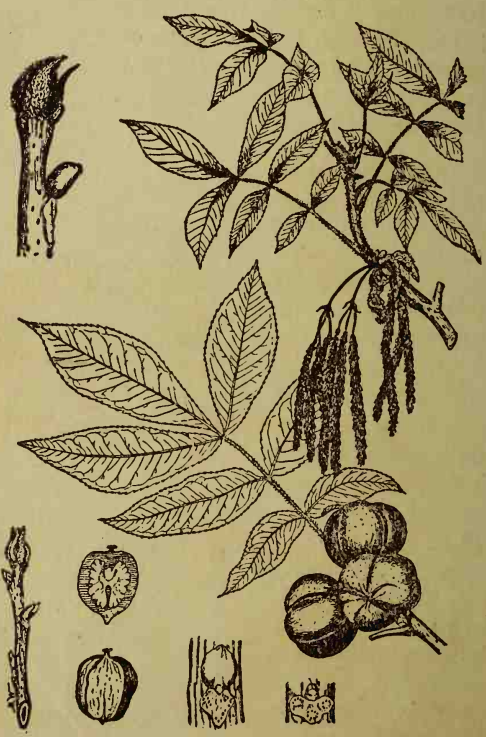
The Big Shellbark is found from southwestern Ontario to Nebraska and Iowa and south to Alabama and Louisiana. It occurs throughout Indiana except in the northwestern counties. It is abundant in the southwestern part of the State, particularly in the lower Wabash bottoms. Moist rich woods and river bottoms are its favorite home. The Shellbark Hickory is its common associate.

WHITE HICKORY

Carya alba, (Linnaeus) K. Koch

THE White Hickory, also called Mocker Nut Hickory and Bull Nut, produces a large nut with a small bitter kernel and yields valuable wood, a large proportion of which is white.

The leaves are alternate, compound with 7 to 9 leaflets, fragrant when crushed, usually hairy on lower surface and along leaf-stalks. The upper pair of leaflets are the largest.



WHITE HICKORY

The fruit is an ovoid nut, 1½ to 2½ inches across, with thick husk and usually round-based nut with thick shell and small bitter kernel.

The bark is gray, furrowed, not shaggy. The twigs are stout, reddish-brown, usually very downy. The buds are large, blunt-pointed, densely hairy, 2/5 to 4/5 of an inch long. The wood is similar to that of the Shellbark Hickory but usually has wider and white sapwood, whence its name White Hickory.

The White Hickory is found from Massachusetts and Ontario to Nebraska and south to Florida and Texas. It occurs throughout Indiana, except the extreme northwestern part. It is infrequent on the glaciated area becoming frequent southward. In most places it grows on hilly ground, but in the lower Wabash valley it is found with the Shellbark and Big Shellbark Hickory in low bottomlands.

PIGNUT HICKORY

Carya glabra, (Miller) Spach

THE Pignut Hickory, commonly called Black Hickory and locally Bitter Hickory, is among the well-known trees of Indiana, especially in the southern part, where it is most plentiful.

The leaves are alternate, compound, 8 to 12 inches long with 5 to 7 leaflets. Leaflets are long, narrow, sharp-pointed, smooth, glossy. They are slightly larger than those of the Bitternut Hickory.

The flowers are similar to those of the other hickories.

The fruit is pear-shaped to spherical, with neck-like projection at base. The husk is thin, often does not split or may split to middle. The kernel is usually small and bitter, and not edible.

PIGNUT HICKORY
One-fourth natural size.

The bark is close-fitting, dark grey, marked with shallow furrows, does not shag off. The twigs are smooth, tough, reddish-brown, marked with pale dots. The buds are oval, blunt-pointed, reddish-brown.

The wood is similar to that of other hickories, but somewhat superior to Bitternut. Formerly it was used extensively for hoop poles and more recently in the manufacture of rustic furniture.

The Pignut Hickory is found from Maine to Minnesota, south to Florida and Texas. In Indiana it is found from the Mississinewa river southward, becoming a common tree in most of the unglaciated areas. It is generally found on the hills, but locally it occurs in the flats. The largest trees reach a diameter of 30 inches.

BITTERNUT HICKORY

Carya cordiformis, (Wangenheim) K. Koch

THE Bitternut Hickory, also called Pignut Hickory and locally within its range, Swamp Hickory and Water Hickory, is usually found in moist to wet locations. One often finds it along streams and in rich woods.

The leaves are alternate, compound, 6 to 10 inches long with 5 to 9 leaflets. Leaflets are long, narrow, sharp-pointed, without stalks except the terminal one.

BITTERNUT HICKORY
One-fourth natural size.

The flowers are of two kinds. They occur on the same tree. The pollen-bearing occur in drooping tassels, 3 to 4 inches long. The nut-producing occur in few-flowered clusters on new growth.

The fruit is a thin-shelled nut with bitter kernel covered with a thin-shelled husk, which splits to middle into 4 valves. Winged projections mark meeting line of husk sections from apex to middle.

The bark is light gray, rather thin, roughened by shallow furrows, does not scale nor shag off. The twigs are slender, smooth, grayish to orange-brown or reddish. The buds are long, flattened, blunt-pointed, covered by 4 yellowish scales.

The wood is heavy, hard, strong, somewhat brittle. It is inferior to that of other hickories, but used for practically the same purposes.

The Bitternut Hickory is found from Quebec to Minnesota, south to Florida and Texas. It is generally distributed throughout Indiana, but is nowhere abundant. In many localities it is dying out rapidly. It is not recommended for the farmer's woodlot on account of its ordinary wood and inferior nuts. This tree may attain a height of 100 feet and 3 feet in diameter.

OTHER INDIANA HICKORIES

THE Pecan—Carya illinoe·.sis, (Wangenheim) K. Koch —has the distinction of producing the best nuts of any native American tree. This tree is not so common as it was formerly in Indiana. It was found chiefly in the southwestern part of the State, extending as far north as Covington and eastward to Clark and Jackson counties. It is hardy in all parts of the State, but in northern Indiana the fruit does not mature on account of the short seasons. A few orchards have been planted in Indiana but so far none have proven profitable. The Pecan is a tall, slender tree with tight-fitting bark that rarely becomes scaly. It has compound leaves with 9 to 17 leaflets, usually about 13. The leaflets generally curve backwards. The fruit is an elongated small nut with sweet kernel and circular in cross-section. The buds are covered with 4 to 6 valvate scales. This tree produces the poorest wood of all the hickories, having only about half the strength and stiffness of the Shellbark Hickory.

Closely related to the Pignut Hickory is the Small-fruited Hickory—Carya ovalis (Wangenheim) Sargent. The prevailing number of leaflets to a leaf is 7. The fruit is usually granular, and rarely tapers to a short stem. The shell of the nut is thin and the kernel rather sweet. It fruits oftener than any other hickory. In Indiana it is found chiefly north of the Wabash river. The Pignut Hickory is most abundant in the southern part of the State. It usually occurs on dry soils. A number of distinct varieties of this tree are recognized.

* * * * * *

"Now the trees are sentient beings; they have thoughts and fancies; they stir with emotion; they converse together; they whisper or dream in the twilight; they struggle and wrestle with the storm."

JOHN BURROUGHS.

RIVER BIRCH

Betula nigra, Linnaeus

THE River Birch is also called Red Birch and Water Birch. It is the most abundant birch of Indiana.

The leaves are simple, alternate, egg-shaped, 2 to 3 inches long and wedge-shaped at base.

The flowers appear about April, are of two kinds. The pollen-bearing are arranged in drooping tassels, 2 to 3 inches long. The seed-producing occur in small spikes about one-third of an inch long.

The fruit is an erect cylindrical spike, 1 to 1½ inches long. The seeds ripen in early summer with 3-lobed scales.

The bark is reddish-brown to cinnamon red, peels off in large thick layers. On old trees the bark becomes thick, deeply furrowed and dark brown. The twigs are reddish-brown and more or less hairy.

RIVER BIRCH
One-third natural size.

The wood is strong, heavy, close-grained, reddish-brown with white sapwood. It is used in the manufacture of woodenware, turnery, pulp and chemicals.

The River Birch extends farther south than any other of our native birches. Its range is from Massachusetts to Minnesota and south to Florida and Texas. This tree is absent in eastern Indiana, most abundant in the southern part, and extends as far north in the western part as Lake county and as far east as Bartholomew, Scott and Clark counties. It is a tree of overflow lands. In the lower Wabash it reaches a diameter of 30 inches. It is usually short-boled and of little commercial importance.

OTHER INDIANA BIRCHES

THE Yellow Birch—Betula lutea, Michaux, f.—also called Silver Birch and Swamp Birch is a rare tree in Indiana.

It is now probably found in a dozen places in the lake region, chiefly in old tamarack bogs. Its southern limit is in Allen county. In this state it rarely exceeds 40 feet in height and 15 inches in diameter. Elsewhere it becomes 100 feet high and 4 feet in diameter. This tree can be recognized by its ragged yellow bark which peels off in thin papery scales.

The Gray Birch—Betula populifolia, Marshall—also called White Birch, is a small tree, of which a local outpost has been reported as occurring in a few places in Indiana bordering Lake Michigan. Probably it is now extinct as a native tree but has been planted for ornamental uses. This tree can be recognized by its close-fitting white bark which does not peel off like that of the Paper Birch. The bark is marked with triangular black blotches. Its twigs are rather rough and its leaves are long-pointed.

The Paper Birch—Betula papyrifera, Marshall—also called Canoe Birch is a northern tree found in a few places in Indiana in low places on the dunes near Lake Michigan. In this State it remains a small tree and can be distinguished by its thin, creamy-white bark which peels off in thin paper-like films. Every boy and girl has learned that this tree was used by the Indians and early settlers in the making of canoes, whence the name Canoe Birch. It is planted locally in Indiana for ornamental purposes. It is also likely that the European White Birch—Betula alba, Linnaeus, is planted as an ornamental tree in Indiana. It also has white bark. The principal varieties of it are the Cut-leaf, the Weeping and the Purple-leaved Birch.

HOP HORNBEAM

Ostrya virginiana, (Miller) K. Koch

THE Hop Hornbeam, also called Ironwood, has appropriate common names, for its fruit is hop-like and the wood is "hard as iron." It is the only tree native to eastern North America that produces hop-like fruit. An examination of the fruit shows that it is made up of a number of loose papery bags in each of which is found a little brown nutlet. The seed bags are arranged in clusters usually from 1 to 2 inches long and attached to the twig by a hairy stem.

HOP HORNBEAM
One-fourth natural size.
Twig section and seed with enclosing membrane enlarged.

The leaves are simple, alternate, 3 to 5 inches long, ovate, long-pointed, finely toothed along the margin.

The flowers are of two kinds. Pollen-bearing and seed-producing occur on the same tree. The former occur in drooping tassels about 2 inches long, and the latter are produced in erect clusters. During winter the partly developed pollen-bearing flower catkins occur in clusters o 3 to 4 at the ends of the twigs.

The twigs are very delicate and interlacing. The thi grayish brown bark peeling off in narrow, flat scales, is als helpful in recognizing this tree. The small reddish-brow buds with four-ranked bud scales are distinctive.

The Hop Hornbeam is widely distributed over the eastern United States. It is found from Cape Breton Island to Florida and west to Minnesota and Texas. It occurs throughout Indiana on dry ground. Beech and Sugar Maple are it chief associates. It is of no commercial importance. It is rarely over 30 feet high and 12 inches in diameter.

AMERICAN HORNBEAM

Carpinus caroliniana, Walter

THE American Hornbeam, also called Blue Beech and Water Beech, is a small bushy tree usually found in moist woods. In appearance it will pass for a little brother of the Beech.

The leaves are simple, alternate, 2 to 4 inches long, ovate, long-pointed, finely toothed along margin.

The flowers are of two kinds, both appearing on same tree. The pollen-bearing occur in tassels about 1 ½ inches long; the seed-producing in few-flowered clusters about ¾ of an inch long.

The fruit is a small, prominently ribbed nut about one-third of an inch long, enclosed in a leaf-like 3-lobed bract, which is usually toothed on one margin of middle lobe. The seed is attached to a leaf-like bract.

The bark is thin, smooth, bluish-green, and marked with distinctive furrows running up and down along the trunk. The twigs are slender, reddish to orange, and covered with scattered pale breathing pores. Small buds are about ⅛ of an inch long, covered with 8 to 12 reddish-brown bud-scales.

AMERICAN HORNBEAM
One-fourth natural size.
Twig section and seed with winged bract, enlarged.

The wood is heavy, hard, and strong. It is sometimes used for levers, tool handles, wedges and mallets.

The American Hornbeam is found from Nova Scotia to Florida and west to Minnesota and Texas. This tree occurs throughout Indiana from old Tamarack bogs to dry oak ridges. It has no commercial value.

SMOOTH ALDER

Alnus rugosa, (Du Roi) Sprengel

THE Smooth Alder, also called Black Alder, is found in swamps, bogs, along the streams and other wet places of the State. It usually remains a shrub, but occasionally it becomes 20 feet high.

The leaves are simple, alternate, obovate, rounded at apex, wedge-shaped at base, finely toothed along margin.

The flowers appear before the leaves and are of two kinds. The pollen-bearing occur in drooping tassels 2 to 5 inches long. The seed-producing are greenish to purplish with scarlet styles. They are about ¼ of an inch long and occur in 2's or 3's at the end of the twigs.

The fruit is a woody cone about ½ of an inch long.

SMOOTH ALDER
Twig section with bud, and leaf-scar enlarged.
One-fourth natural size.

The bark is thin, smooth, often grooved, grayish-green, dotted with numerous brown lenticels and marked with white blotches. The twigs are greenish to grayish brown, dotted with brownish lenticels. The buds are alternate, ½ of an inch long, evidently stalked, blunt-pointed, covered with 2 scales. The wood is yellowish brown and marked with broad rays.

The Smooth Alder is found from Maine to Florida and Texas and west to Minnesota. It occurs locally in Indiana. The closely related Speckled Alder-Alnus incana is rather frequent in the dune area about Lake Michigan and along Pigeon river. Its bark is marked with pale dots, and its leaves are doubly toothed along the margin and glaucous beneath.

CHESTNUT

Castanea dentata, (Marshall) Bork.

PRIOR to its attack by the Chestnut blight, the Chestnut was one of the most important American forest trees.

The leaves are simple, alternate, 6 to 8 inches long, sharp pointed and coarsely toothed.

The flowers appear in June or July. They are arranged in slender, yellowish-white, pencil-like plumes. Pollen-bearing make up most of these plumes. The seed-producing occur in small numbers near the base of the plumes.

The fruit is a prickly bur with 1 to 5 nuts maturing in September or October.

The bark on branches and small trunks is smooth, brownish and close-fitting; on old trunks becomes grayish-brown and deeply furrowed. The twigs are smooth, greenish to brown, dotted with numerous small white breathing pores. The buds are alternate, ¼ of an inch long, blunt-pointed covered with 2 to 3 chestnut brown scales.

CHESTNUT
One-fourth natural size.
Twig sections and single flowers, enlarged.

The wood is light, soft, not strong, coarse-grained, durable. It is used for posts, poles, ties, general construction and interior finish.

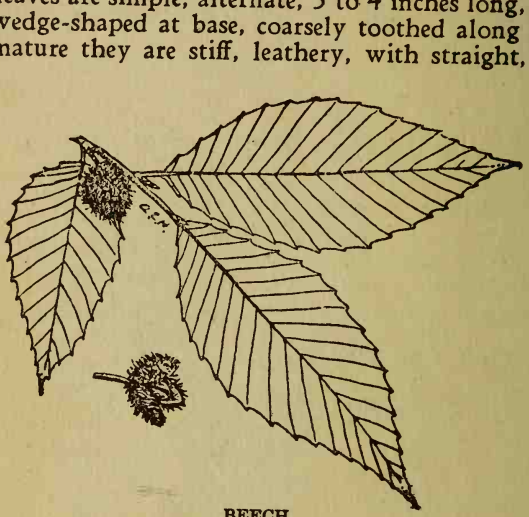
The Chestnut is found from Maine to Michigan, and south to the Carolinas, Georgia and Arkansas. It is confined to the sandy soil and sandstone outcrops of south-central Indiana. In Jackson county it goes north into the glaciated area.

BEECH

Fagus grandifolia, Ehrhart

NO hardwood tree is more beautiful or more easily recognized than the American Beech.

The leaves are simple, alternate, 3 to 4 inches long, pointed at tip, wedge-shaped at base, coarsely toothed along margin. When mature they are stiff, leathery, with straight, sunken veins.



BEECH
One-half natural size.

The flowers are of two kinds, appear about April. The pollen-bearing occur in stalked round heads; the nut-producing in a few-flowered clusters.

The fruit is a stalked, prickly, four-valved bur, usually produced in pairs, containing triangular, pale brown, shining nutlets with sweet kernel.

The bark is smooth, light gray, often marked with initial carvings. The twigs are slender, dark gray, marked with a circle of bud-scale scars. The buds are alternate, slender, conical, sharp-pointed, ¾ of an inch long, 5 times as long as wide, covered with 10 to 20 reddish-brown scales.

The wood is very hard, strong, tough, not durable in contact with soil. It is an excellent fuelwood, and is used extensively in the manufacture of charcoal, chemicals, novelties.

The Beech is found from Nova Scotia to Wisconsin and south to Florida and Texas. Numerically it is probably the most common tree in Indiana. It occurs throughout the State. The nuts of the Beech were used by the pioneers to fatten their hogs.

THE OAKS

OF the 300 Oaks known in the world, 55 are native to North America, and most of these occur in the eastern United States. The oaks make up the largest group of forest trees native to Indiana. In all there are 17 different kinds of oaks native to this State. They grow under a wide range of conditions and show wide variations in form and other distinguishing characteristics. The best way to get acquainted with Indiana oaks is to divide them into two major groups, the one group to comprise the White Oaks and the other the Black Oaks. It is easy to place the oaks of Indiana in these two groups by remembering the following characteristics of each.

THE WHITE OAKS: The leaves of the members of this group have rounded lobes (not bristle-tipped), and the kernels of the acorns are usually sweet. All the oaks of this group mature their acorns in a single season; for this reason they are sometimes called Annual Oaks. The eight Indiana members of this group are White Oak, Swamp White Oak, Bur Oak, Post Oak, Chestnut Oak, Yellow Oak, Cow Oak and Overcup Oak.

THE BLACK OAKS: The leaves of the members of this group have bristle-tipped (not round-lobed) leaves and the kernel of their acorns is usually bitter. All the oaks of this group require two seasons to mature their acorns; for this reason the representatives of this group are sometimes called Biennial Oaks, which means two-year oaks in contrast with the one-year white oaks. The immature acorns are very helpful in recognizing the members of the Black Oak group, especially during the winter months when the trees are without leaves. The nine Indiana members of this group are Black Oak, Red Oak, Scarlet Oak, Pin Oak, Spanish Oak, Black Jack Oak, Shingle Oak, Schenck's Oak and Hill's Oak.

The sign of all oaks is the acorn. It is an unfailing distinguishing characteristic. Man has good reasons for his high regard for the oaks. History shows that the human race has been helped from the earliest ages by them, and the people of today enjoy a long list of good things they provide. Their most important gift is wood. They also supply us with cork, dyeing materials, tanning products, food for wild and domestic animals, and many other valuable products.

WHITE OAK

Quercus alba, Linnaeus

THE White Oak is the most important hardwood forest tree native to North America. It has held this front rank place since the earliest days of colonization. The original forests of the rich agricultural areas of Indiana were largely made up of this great tree.

The leaves are simple, alternate, 5 to 9 inches long, 2 to 4 inches wide. They are divided into 3 to 9, usually 7, blunt-pointed, finger-like lobes. Mature leaves are deep green above and light green beneath.

The flowers appear about May and are of two kinds. The pollen-bearing occur on the old growth in drooping tassels 2 or 3 inches long. The acorn-producing occur in small clusters on the new growth.

The fruit is a sessile or short-stalked acorn maturing in one season. The light brown nuts are about ¾ of an inch long, seated in a warty cup, enclosing about ¼ of nut. The nuts are relished by wild animals.

WHITE OAK
One-fourth natural size.
Single flowers and twig sections, enlarged.

The bark is grayish-white and peels off in numerous loose scales. The early settlers made it into a tea used in the treatment of tonsilitis. The twigs are smooth, light-gray, dotted with light lenticels.

The buds are alternate, egg-shaped, blunt-pointed, reddish-brown, clustered at end of twigs.

The wood is heavy, hard, strong, close-grained, light-brown, durable. Its uses are interior finish, flooring, furniture, general construction, implements and fuel.

The White Oak is found from Maine to Minnesota and south to Florida and Texas. It is common throughout Indiana, and next to beech the commonest tree of the State. This tree reaches its best development on rich moist soil, where it attains a height of 75 to 100 feet and 2 to 4 feet in diameter.

SWAMP WHITE OAK

Quercus bicolor, Willdenow

THE Swamp White Oak is usually found in swamps, about ponds, and along the banks of streams. In youth it is rather attractive, but with advancing years it becomes ragged and unkempt in appearance.

The leaves are simple, alternate, 5 to 6 inches long, broad, wavy-toothed on margin, dark green above, light green and hairy on lower surface. They are broadest between the middle and the apex.

SWAMP WHITE OAK
One-third natural size.

The flowers and wood are similar to those of the White Oak.

The fruit is a long-stalked acorn that matures in one season. The acorns are about an inch long and usually occur in pairs.

The bark on old trunks is thick, grayish-brown and breaks in long deep furrows. On the small branches it sheds off in flakes like that of the Sycamore. The twigs are stout, yellowish to reddish-brown. The buds are about ⅛ of an inch long, blunt-pointed, smooth, reddish-brown.

The Swamp White Oak is found from Maine to Michigan and south to Georgia and Arkansas. It is common in wet woods of northern Indiana, also on the flats of the southeastern part and the river bottoms of the southwestern part, but rare or absent on the hills in the south-central part. Trees 2 to 4 feet in diameter and 80 feet high are not unusual. The largest specimen of Swamp White Oak ever recorded was the Wadsworth Oak in New York, which was 27 feet in circumference. It was near this tree that Robert Morris and the Seneca Indians made an important treaty in 1797.

BUR OAK

Quercus macrocarpa, Michaux

THE Bur Oak, also called Mossy Cup Oak is one of the largest of American Oaks. It often reaches a height of 100 feet and 4 to 7 feet in diameter.

The leaves are simple, alternate, 6 to 12 inches long, 3 to 6 inches wide, shiny and deep green above, pale and finely hairy beneath. Near the middle are deep clefts.

The flowers and wood are similar to those of White Oak.

The fruit is a large acorn maturing in one season. The nuts are ¾ of an inch long with a white and sweet kernel. The cup is bordered by distinct fringe along margin.

The twigs are stout, yellowish-brown and usually marked with corky winged projections. The buds are alternate, ⅛ of an inch long, blunt-pointed, reddish-brown, clustered at end of twigs. The bark becomes deeply furrowed and has a tendency to peel off in flaky scales.

BUR OAK
One-third natural size

It is found from New Brunswick and Nova Scotia west to Manitoba, and south to Georgia, Kansas and Texas. It is found in all parts of Indiana except the "knob area." About 5 miles northwest of Warsaw, Indiana, is a Bur Oak 7 feet in diameter and 50 feet to the first branch. It is probably one of the largest oaks in the United States.

The Bur Oak is a valuable timber tree and is being used for ornamental planting. It is easy to transplant, grows rapidly, has few insect enemies.

POST OAK

Quercus stellata, Wangenheim

THE Post Oak was given its name in pioneer days when it was used extensively for posts, a use for which it is well adapted on account of its durability.

The leaves are simple, alternate, coarse, stiff leathery in texture, 4 to 6 inches long. They are dark green and shiny on the upper surface, have a heavy coating of rusty brown hairs on lower surface. Under a magnifying glass the hairs are star-shaped whence the specific name "stellata." The two basal lobes are small and the three terminal lobes are large and generally squarish in outline. Near the middle of the leaf is a deep cut that almost separates the leaf in two parts.

POST OAK
One-third natural size

The flowers are like those of the other oaks. See White Oak.

The fruit is a small acorn maturing in one season. The nut is about ½ of an inch long, dark brown, often striped. The cup is shallow, covered with pale woolly scales, enclosing about 1/3 of nut.

The bark is darker, rougher and less scaly than White Oak. The twigs are stout, hairy and rusty. The buds are alternate, ⅛ of an inch long, blunt-pointed, reddish-brown, clustered at end of twigs.

The wood is similar to White Oak and used for the same purposes.

The Post Oak, also called Iron Oak, is found from Massachusetts to Kansas and south to Florida and Texas. In Indiana it is confined to the southwestern part of the State, where it usually occurs on poor soil. It is a medium-sized tree, rarely exceeding 60 feet in height and 3 feet in diameter.

CHESTNUT OAK

Quercus Prinus, Linnaeus

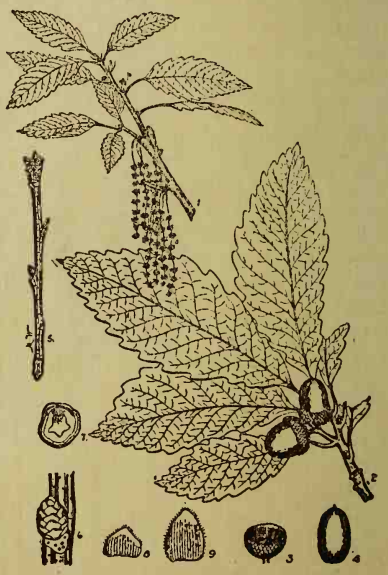
THE Chestnut Oak, also called Rock Oak, and Tanbark Oak, is an important forest tree. Its importance will grow for it produces valuable wood, and yields bark rich in tannin.

The leaves are simple, alternate, stiff, 5 to 9 inches long, 2 to 4 inches wide, coarsely toothed along margin.

The flowers are similar and the wood ranks close to White Oak.

The fruit is a large acorn maturing in one season. The nut is 1 to 1½ inches long, oval, smooth, glossy, chestnut brown. The cup is thin, deep, hairy inside, covers one-third of nut.

The bark on young stems and branches is smooth, thin, yellowish-brown. On old trunks it is thick, brown to black, deeply furrowed. The bark ridges are high, sharp and angular. At the bottom of the furrows the bark is cinnamon red. It is rich in tannin.



CHESTNUT OAK
One-third natural size.
Twig section and bud scales enlarged.

The twigs are slender, angular, orange brown. The buds are light-brown, ¼ to ½ of an inch long, sharp-pointed, and clustered at tip of twigs.

The Chestnut Oak is found from Maine to Ontario, south to Alabama and Tennessee. It reaches its best development in the Alleghenies of Pennsylvania and southward. In Indiana it is confined almost entirely to the crest of ridges in the unglaciated part of the State. Its eastern limit in the State is in Clifty Falls State Park, and a few trees on the knobs of Spencer county marks its western limit.

CHINQUAPIN OAK

Quercus Muhlenbergii, Engelmann

THE Chinquapin Oak, also called Sweet Oak, Yellow Oak and Chestnut Oak, was a favorite tree among the pioneers of Indiana who sought it for fence posts because of its durability.

The leaves are simple, alternate, 4 to 8 inches long, taper-pointed at apex, smooth and dark green above, grayish hairy beneath, with coarsely toothed margins, divided by more or less incurved teeth.

The flowers are similar to those of the White Oak.

The fruit is an acorn, generally stalkless and maturing in one season. The nut is ovoid, ½ to 1 inch long, enclosed for about ½ its length by thin cup covered with brown woolly scales.

The bark is grayish-brown. The twigs are slender, reddish-brown at first hairy but become smooth. The buds are chestnut brown, sharp-pointed, about 1/6 of an inch long. The wood is similar to that of the White Oak.

CHINQUAPIN OAK

The Chinquapin Oak is found from Vermont to Minnesota and south to Florida and Texas. In Indiana it occurs in limited numbers in all parts of the State, being rare in the northwestern part, and more common south of the Wabash river. It was one of the favorite trees of wild pigeons before they became extinct. Its fruit is the most edible of all our oaks.

RED OAK

Quercus rubra, Linnaeus

THE Red Oak is one of the biggest, stateliest, and handsomest trees of eastern North America. As early as 1740 it was introduced into Europe.

The leaves are simple, alternate, 5 to 9 inches long, 4 to 6 inches wide, 7 to 9-lobed. Lobes are bristle-tipped and separated by clefts that reach halfway to midrib.

The flowers appear with the leaves. The pollen-bearing are arranged in drooping tassels; the acorn-producing occur in few-flowered clusters on new growth.

The fruit is an acorn maturing in two seasons. The cup is wide, shallow, covered with over-lapping reddish-brown scales, enclosing only base of nut. The nuts average one inch long, ½ to ¾ of an inch wide, are flat at base and short-tipped at apex.

RED OAK
Twig, one-half natural size.
Leaf, one-third natural size.

The bark on young stems is smooth, grayish or brown. On older trunks it becomes rough with furrows separating wide, smooth grayish to brownish ridges. The lateral branches are straight and ascend at about an angle of 45 degrees. The twigs are smooth and rich brown. The buds are ¼ of an inch long, sharp-pointed, smooth, glossy, reddish-brown, without hairs.

The wood is heavy, hard, strong, light reddish-brown, with light sapwood. It is used for furniture, interior finishing, ties, and general construction.

The Red Oak has a wide distribution. It is found from Nova Scotia to Minnesota and Kansas south to Florida and Texas. It is found throughout Indiana, but occurs only locally in the knob area, and becomes rare in the southern counties. Moist, porous, sandy to gravelly clay soils are its favorite homes. It is one of the most important timber trees of North America, reaching a height of more than 100 feet and an age of 300 or more years.

BLACK OAK

Quercus velutina, Lambert

THE Black Oak, also called Yellow Oak, is one of the most common trees of Indiana. It sometimes reaches a height of 100 feet and 4 feet in diameter. By its bark one can always recognize this tree. Its outer bark is black and its inner bark is distinctly yellow.

The leaves are simple, alternate, 4 to 10 inches long, 3 to 6 inches wide, usually 7-lobed with bristle tips. The lower leaf surfaces are pale green to rusty brown.

The flowers are similar to those of other oaks.

The fruit is an acorn maturing in two seasons. Cups are cup-shaped, light brown, often slightly fringed along margin, enclose ½ of nut. Nuts are ½ to 1 inch long, light reddish-brown.

BLACK OAK
One-fourth natural size.
Twig section, enlarged.

The bark on older trunks is black, thick, very rough. Twigs are stout, angular, reddish-brown, often hairy. Buds are large, sometimes ½ of an inch long, angular, covered with a coating of yellowish or dirty-white hairs.

The wood is similar to that of Red Oak.

The Black Oak is found from Maine to Ontario, south to Florida and Texas. It occurs throughout Indiana but is confined to the poorer soils. It is rare in the rich agricultural part of the State, becoming very common on the sandy and gravelly soils of northern Indiana and the hills of the southern part of the State.

SCARLET OAK

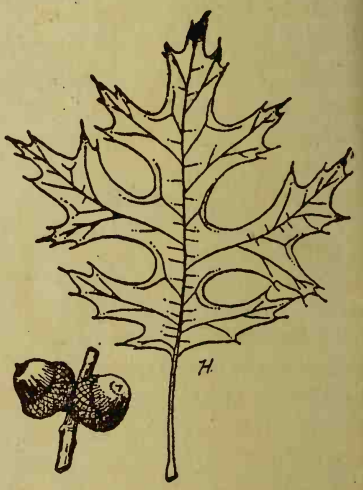
Quercus coccinea, Muench

THE Scarlet Oak is one of the showiest oaks in the eastern part of its range, but in Indiana it does not develop its beautiful foliage of brilliant scarlet to gorgeous red.

The leaves are simple, alternate, 3 to 6 inches long, 3 to 5 inches wide, 5 to 9-lobed. Lobes are bristle-tipped and separated by deep clefts.

The flowers resemble those of other oaks.

The fruit is an acorn maturing in two seasons. The cup is thin, narrowed at base, often glossy on surface, covers ½ of nut. The nut is three-fifths of an inch long, reddish-brown.



SCARLET OAK
Leaf and acorns, one-third natural size.

The bark on small stems and branches is smooth, thin, light to grayish-brown, becomes rough and irregular on older trunks, sometimes almost black near base. Flat-topped ridges occur between shallow furrows. Inner bark is of a pale-coloring. Dead limbs often persist along lower trunk. The twigs are smooth, rather slender, reddish to grayish-brown. The buds are about ¼ of an inch long, covered with a pale wool from apex to middle.

The wood is rather strong, heavy, hard, coarse in texture. It does not have a wide commercial use, but is valuable for fuel, ties and general construction.

The Scarlet Oak is found from Maine to Minnesota south to North Carolina and west to Nebraska. In Indiana it is extremely local outside of the hill country, where it usually occurs on the crest of ridges. In the northern part of its range this tree is rather small, but toward its southern limits it becomes 80 feet high and 3 feet in diameter. It is of little commercial importance in Indiana, where many mature trees show rot and other defects.

PIN OAK

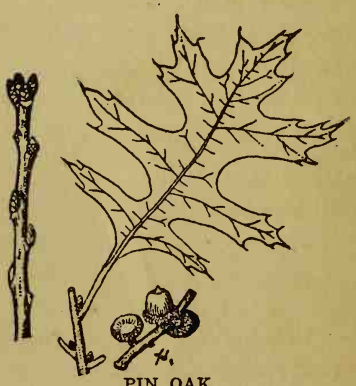
Quercus palustris, Muench

THE Pin Oak, also called Water Oak and Swamp Oak, is one of the most attractive oaks native to North America. Its trunk usually remains unbranched and the lateral branches take a horizontal position along the middle of the trunk. At the bottom they are drooping and those at the tip are ascending.

The leaves are simple, alternate, 4 to 6 inches long, 2 to 4 inches wide, 5 to 9-lobed. Lobes are bristle-tipped and separated by deep clefts. They resemble those of the Scarlet Oak, but are coarser and less lustrous.

The flowers are similar to those of other oaks.

The fruit is a tiny acorn, maturing in two seasons. The cup is thin, shallow, saucer-shaped, about ½ of an inch across. The nut is light brown, often striped, about ½ of an inch long.



PIN OAK

Leaf and acorns, one-third natural size. Twig, one-half natural size.

The bark is rather smooth, grayish or dark-brown. The twigs are smooth, shiny, grayish-brown. The branches are thickly set with stiff pin-like twigs, whence its name Pin Oak. The buds are small, smooth, light-brown.

The wood is rather heavy, hard, and strong. It warps and checks freely. It is used for fuel, ties and general construction work.

The Pin Oak is found from Massachusetts to Michigan south to Tennessee and Oklahoma. It is found throughout Indiana, usually occurring in swampy woods. It is a medium-sized tree reaching a height of 75 feet and a diameter of 3 feet. It is used for shade, park, and street planting. For forestry purposes it should be replaced by the Red Oak.

SHINGLE OAK

Quercus imbricaria, Michaux

THE Shingle Oak, also called Laurel Oak, Peach Oak, Jack Oak and Water Oak, is among the unique oaks of North America. At first glance it appears to be an oversize laurel because of its laurel-like leaves, but a close examination reveals acorns, placing it definitely among the oaks.

The leaves are simple, alternate, 4 to 6 inches long, 1 to 2 inches wide, wedge-shaped at base, sharp-pointed at apex, smooth along margin.

The flowers are similar to those of Red Oak.

The fruit is a small acorn maturing in two seasons. The nut is egg-shaped, about ½ of an inch long, dark brown. The cup is saucer-shaped, reddish-brown, enclosing almost ½ of nut.

SHINGLE OAK

The bark is light to grayish-brown becomes rough with shallow furrows. On young trunks it is smooth and shiny. The twigs are smooth, shiny, and dark brown. The buds are about ⅛ of an inch long, chestnut-brown.

The wood is rather heavy, hard and strong. It is similar to Red Oak, but inferior.

The Shingle Oak is found from Pennsylvania to Michigan, south to Georgia and Arkansas. It occurs throughout Indiana, becoming frequent to common in the southwestern part. This tree is usually found on low ground, but sometimes occurs near the base of slopes, and in the "knob area" it is found on the crest of ridges.

The Shingle Oak may reach a height of 80 feet and a diameter of 3 feet. The attractive form and beautiful foliage of this tree recommend it for ornamental planting.

OTHER INDIANA OAKS

THE Cow Oak—Quercus Michauxii, Nuttall—also called Basket Oak, is one of the most beautiful oaks of Indiana. It is more or less frequent in the flats of southeastern Indiana and in the bottoms of the southwestern part. It is a tree of the lowlands. When grown in the open it forms an ovate head and its autumnal coloration is a gorgeous hue of red and brown. It should become one of the principal trees of the farmers' woodlot. It resembles the Chestnut Oak but the lower surfaces of its leaves are velvety to the touch and its gray bark is scaly like that of the White Oak.

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The Over-cup Oak—Quercus lyrata, Walter—is one of the rarest oaks of Indiana. It is found only in inundated areas about river sloughs and swamps in the southwestern part of the State. Among its associates are the Pecan and Pumpkin Ash. It resembles the Bur Oak but lacks the fringed acorn cups, and the apex of leaf lobes are generally sharp-pointed.

* * * * * *

The Black Jack Oak—Quercus marilandica, Muenchhausen—is a small tree found only on the very poorest soils of Indiana. It occurs chiefly in the hill country and on a few ridges in the southwestern part of the State. It can be distinguished by its large leaves which usually spread abruptly near the tips, are widest between the tip and the middle, and hairy on the lower surface. They resemble those of the Black Oak. The leaves of the latter are more deeply lobed and its mature twigs are smoother.

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A form of the Red Oak with leaves cut more than half way to the midrib is sometimes referred to as Schenck's Oak—Quercus Schenckii, Britton. It is more or less frequent throughout the Wabash valley of Indiana.

AMERICAN ELM

Ulmus americana, Linnaeus

OF all trees native to North America, the American Elm, also called White Elm and Water Elm, is probably the best known and most admired. For beauty, grace, and stateliness this tree has no superior.

The leaves are simple, alternate, 4 to 6 inches long, unequally based. The veins run straight from the midrib to the doubly toothed margins.

The flowers appear early in spring before the leaves. They are greenish and occur in small drooping clusters.

The fruit is a small seed, surrounded completely by a thin, flat, membrane-like wing. It matures after the flowers, and is about ½ of an inch across.

AMERICAN ELM
One-fourth natural size.

The bark is grayish-brown, rather thick, roughened by shallow furrows, sometimes flaky or corky. The twigs are smooth or sometimes hairy, reddish-brown, marked with obscure pale breathing pores. The leaf-scars are marked with three distinct bundle-scars. The buds are egg-shaped, usually smooth, covered with 6 to 10 overlapping reddish-brown scales with darker margins.

The wood is heavy, hard, tough, rather durable, dark brown to red with lighter sapwood. It is used for barrels, agricultural implements, posts, ties and novelties.

The American Elm has a total range of more than 2,500,000 square miles. It extends from Newfoundland west to the Rocky Mountains, a distance of 3,000 miles, and south to Florida and Texas, a distance of 1,200 miles. It is frequent to common on low ground in all parts of Indiana. It often reaches a height of 80 to 100 feet and a diameter of 2 to 4 feet.

Its wide range, good wood, rapid growth, and adaptation to a wide range of soils, suggest good care and protection in places suited to its growth. For ornamental and roadside planting this tree is especially desirable.

SLIPPERY ELM

Ulmus fulva, Michaux

THE Slippery Elm, also called Red Elm, has been a well-known tree ever since the pioneer hunters and early travellers learned that its bark has excellent properties for quenching thirst and staying hunger. The bark is still held in esteem for the treatment of throat trouble, fevers and inflammation.

The leaves are simple, alternate. 5 to 7 inches long, rough, unequally based, doubly toothed on margin.

The greenish flowers appear early in spring before the leaves. They occur in few-flowered clusters along twigs.

The fruit is a small seed surrounded completely by a thin, flat, membrane-like wing. It is about ½ of an inch across and matures shortly after the flowers.

SLIPPERY ELM
One-fourth natural size.
Twig section, leaf-scar and flowers, enlarged.

The bark is dark brown tinged with red, becomes rough and furrowed. Inner bark is slippery, fragrant, mucilaginous. The twigs are grayish and rather rough when mature. The buds are dark chestnut-brown, covered with about 12 hairy rusty-brown scales.

The wood is heavy, hard, tough, dark brown to red, with light sapwood. It is used for barrels, agricultural implements, posts, ties, and novelties.

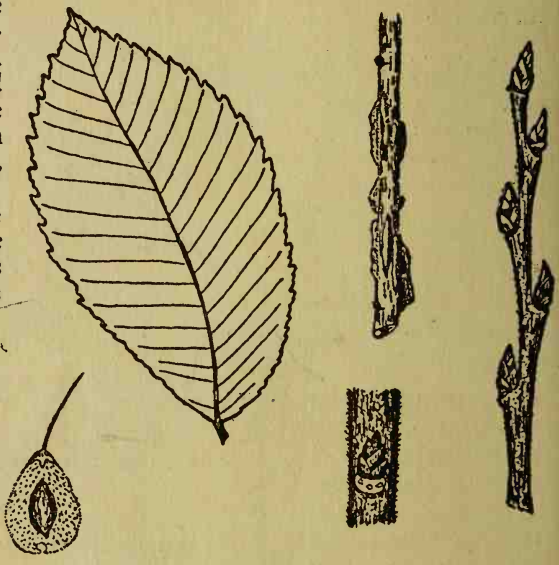
The Slippery Elm is found from the Valley of the St. Lawrence, south to Florida and west to North Dakota and Texas. It is found in all parts of Indiana, preferring moist soil. Like the American Elm, it is becoming more abundant in many places in the State.

ROCK ELM

Ulmus racemosa, Thomas

THE Rock Elm, also called Hickory Elm, sometimes reaches a height of 100 feet and a diameter of 5 feet.

The leaves are alternate, simple, 3 to 6 inches long, coarsely toothed along the margin, unequally based, thick and firm in texture. The flowers appear in March and April before the leaves in slender stalks, drooping, raceme-like clusters. The fruit matures in May. It is a small one-seeded samara, surrounded with a thin membraneous wing about one-half of an inch long and hairy all over. The bark on the main trunk is thick, ridged with wide furrows separating flat scaly ridges. The twigs are at first light brown and hairy, become shiny reddish-brown finally grayish-brown with corky winged projections. The buds are alternate, egg-shaped, brownish, about one-fourth of an inch long, with minutely hairy bud-scales. The wood is heavy, very strong, tough, light reddish-brown with light sapwood. It is used for purposes requiring toughness, solidity and flexibility.



ROCK ELM

The Rock Elm is found from Quebec, westward to Ontario, Michigan and Wisconsin and northeast Nebraska and southward through the New England states to New York and central Indiana. This tree occurs in practically all parts of Indiana. It prefers a rich well-drained soil. In the glaciated region it becomes large. It is a valuable timber tree and locally is planted for ornamental purposes. In southwestern Indiana the beautiful Winged Elm—Ulmus alata, Michaux—is found locally.

HACKBERRY

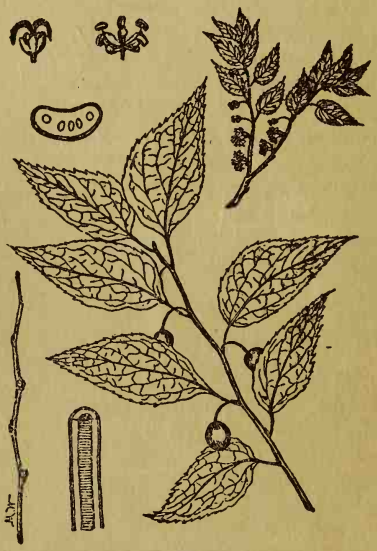
Celtis occidentalis, Linnaeus

THE Hackberry, also called Sugarberry, belongs to the Elm family.

The leaves are simple, alternate, ovate, 2 to 4 inches long, finely toothed along margin, sharp-pointed, rounded and often lopsided at base, rough on upper surface, with prominent primary veins.

The flowers are small, greenish and borne on slender stalks. The fruit is a round, dark purple berry about ¼ of an inch in diameter. It matures about September, hangs far into winter, and is eaten freely by birds and other animals.

The grayish brown bark ranges from smooth when small to very rough. Hard wart-like bark projections are common on medium-sized trees. The twigs are slender, tend to zigzag, and are often grouped in dense clusters known as "witches-brooms." They contain a pith that is made up of thin white plates separated by wide air spaces. This is known as "chambered pith."



HACKBERRY
One-fourth natural size.
Twig section, flowers and leaf-scar, enlarged.

The wood is yellowish, rather heavy, and coarse-grained. It is used chiefly for crates, boxes, handles and agricultural implements.

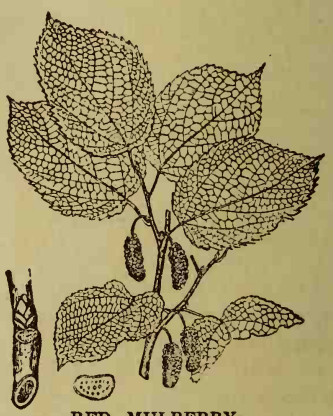
The Hackberry is generally distributed in the United States east of the Rocky Mountains. It occurs throughout Indiana, generally along streams. It is rarely over 90 feet high. Another Sugarberry (Celtis mississippiensis) is found in the lowlands of southwestern Indiana. It has smoother bark, cherry-red fruit, and leaves with smooth margins towards the base.

RED MULBERRY

Morus rubra, Linnaeus

THE Red Mulberry, also known as "Mulberry," came in the limelight in the early days of American history. The early pioneers were inspired with the false hope that it was a new source of food for the silkworm. The outcome was altogether disappointing.

The leaves are simple, alternate, 3 to 5 inches long, roundish, short-tipped, deep green and with deeply sunken veins on upper surface. Some leaves are lobed and resemble an ordinary mitten. The leaf-stalks give a milky secretion upon being squeezed.



RED MULBERRY
One-fourth natural size. Twig section, natural size. Leaf-scar, enlarged.

The flowers are of two kinds. Pollen-bearing and seed-producing occur in short drooping tassels.

The fruit is a soft, fleshy, dark red to black aggregation of many-seeded berries. They are sweet, juicy, and greatly relished by man, birds, and various other animals.

The bark is rather thin, dark, grayish-brown, begins to roughen about the third year, peels off in thin scales. The twigs are smooth, clean, light greenish-brown, and bear oval, hollowed-out leaf-scars dotted with numerous bundle-scars. The bowl-shaped leaf-scars are helpful in recognizing this tree in winter.

The wood is soft, light, not strong, orange yellow to brown. It is durable in contact with soil, and used chiefly for fence posts.

The Red Mulberry rarely exceeds 50 feet in height and 2 feet in diameter. It grows from Massachusetts west to Kansas and south to Texas and Florida. It is found throughout Indiana but is not common anywhere. It is usually found as a solitary tree. Rich moist soil of valleys and foothills is its favorite home. The tree should be protected to insure a food supply for birds.

CUCUMBER TREE

Magnolia acuminata, Linnaeus

THE hardiest Magnolia native to eastern North America is the Cucumber Tree. In appearance it suggests a tropical tree for its leaves and flowers are large.

The leaves are simple, alternate, thin, egg-shaped, 4 to 12 inches long, pointed at apex, smooth along margin. They fall in response to first frost.

The flowers are large, upright, solitary, bell-shaped about 3 inches long, greenish tinged with yellow, difficult to see among foliage.

The fruit is a red cucumber-like mass, 2 to 3 inches long, containing scarlet, pea-size seeds suspended by long slender white threads at maturity.

The bark is grayish to brown, breaks up into long furrows. The twigs are smooth, shiny, bitter, rather stout, brown, marked with crescent-shaped leaf-scars. The buds are conical, sharp-pointed, about ½ of an inch long, and pale silky.

CUCUMBER TREE
One-fourth natural size.
Seeds and twig section, enlarged.

The wood is soft, not strong, brittle, light yellowish to reddish-brown. It is used for same purposes as Yellow Poplar.

The Cucumber Tree is found from western New York south to Illinois, Georgia and Arkansas. It occurs locally throughout southern Indiana, especially southward of Franklin and Knox counties. Rich moist woods with abundant sunlight is its favorite home. Good wood, rapid growth, few foes are among its principal merits. It is a beautiful tree for lawns and parks. It is too rare in Indiana to be of economic importance.

TULIP TREE

Liriodendron Tulipfera, Linnaeus

THE Tulip Tree, also called Yellow Poplar, and Whitewood, is one of the most distinctive of American trees, and has been adopted as the State Flower of Indiana.

TULIP TREE

Leaf and flower, one-third natural size. Twig, two-thirds natural size.

The leaves are simple, alternate, usually 4-lobed, 4 to 6 inches across, appear to have tips cut off at right angle to stem, and are long-stalked. At the base of each leafstalk are two leaf-appendages. The flowers are tulip-like, 1½ to 2 inches deep, greenish-yellow with 3 reflexed sepals and 6 petals. The fruit is made up of long winged nutlets arranged in light brown, cone-like clusters 2½ to 3 inches long.

The bark when young is smooth, bitter, ash-gray to brown, mottled with light blotches. On old trunks it becomes thick, brown, deeply furrowed. The twigs are smooth, shiny, stout, reddish-brown, marked with pale obscure breathing pores. Complete rings of stipule-scars surround twigs. The buds are smooth, flattened, ¼ to ½ of an inch long, blunt-pointed, reddish-brown, covered with one pair of bud-scales. Within buds are small miniature leaves. The wood is soft, not strong, light, white-yellowish to brownish, works easily. It is used for furniture, interior finishings, woodenware, novelties, and veneer.

The Tulip Tree is found from Rhode Island to Michigan, south to Florida and Arkansas. It occurs throughout Indiana, becoming rare in the northern part. Deep rich moist soil is its favorite home. It frequently reaches a height of 100 feet and a diameter of 5 feet. It is well adapted for use in Indiana woodlots.

PAPAW

Asimina triloba, Dunal

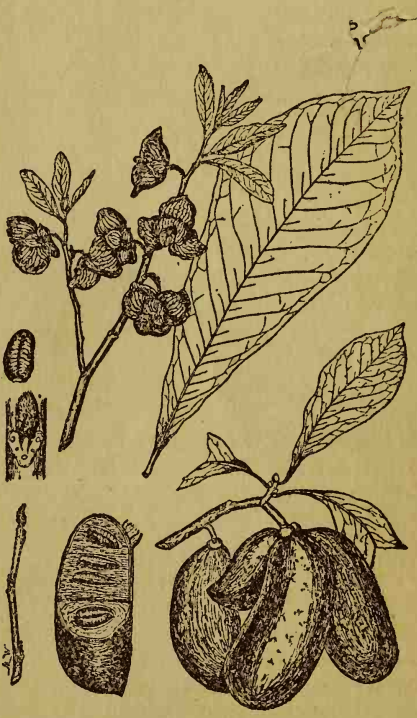
THE Papaw is a dainty tree rarely exceeding 30 feet in height. A mere glance at it in summer suggests that it has escaped from the tropics, for its leaves are truly tropical and its fruit resembles a stubby banana.

The leaves are simple, alternate, 4 to 12 inches long, thin in texture, short-pointed, long tapering at base, smooth on margin.

The flowers are large, 1 to 1½ inches wide, solitary, at first green, later reddish, occur below leaves, are borne on short stalks.

The fruit suggests a stubby banana, 3 to 5 inches long, at first green, yellowish to dark brown when ripe, contains many dark brown shiny flat seeds scattered throughout flesh.

The bark is thin, smooth, dark brown, often dotted with light blotches. The twigs are rather slender, smooth, olive brown, enlarged at nodes. The buds are brown, naked, hairy. The terminal bud is large and flattened. Flower buds are round, 1/6 of an inch in diameter, very hairy, dark brown.



PAPAW
One-fourth natural size.
Twig section and bud, enlarged.

The Papaw is found from western New York and New Jersey south to Florida and west to Michigan and Texas. It occurs throughout Indiana but becomes rare in the hill country. This tree is of no commercial value on account of the wood it produces, but deserves to be planted ornamentally because of its tropical leaves, unique flowers, and peculiar fruit. The fruit with white pulp is rather insipid, that with yellow pulp is tasty.

SASSAFRAS

Sassafras variifolium, (Salisbury) Kuntze

THE Sassafras is a distinctive tree. It is recorded that Sassafras bark and roots were among the first cargoes shipped from the American colonies. The bark and roots are still used locally in the manufacture of Sassafras Tea.

The leaves are simple, alternate, egg-shaped, 4 to 6 inches long, usually smooth along margin. Sometimes 2 to 5-lobed leaves are found on same twig with the normal leaves. The glove form of leaves are distinctive.

The flowers appear with the leaves and are of two kinds. They are greenish-yellow, and arranged in loose, short-stalked clusters.

The fruit is a dark blue, shiny berry borne on a stout red stem. It is excellent bird food.

The bark becomes rough early. On old trunks is reddish-brown, deeply furrowed, separates in thin scales. The twigs are rather brittle, yellowish-green, aromatic, sometimes hairy. The inner bark is very mucilaginous. The buds are about 3/5 of an inch long, slightly hairy, greenish, covered with a few bud-scales.

SASSAFRAS
One-fourth natural size.
Single flowers and bud, enlarged.

The wood is soft, brittle, durable, aromatic, dull orange-brown, with light sapwood. It is used for posts, furniture, interior finishing, crates, coffins.

The Sassafras is found from Massachusetts to Florida and west to Michigan and Texas. It is occurs throughout Indiana but is commonest in the southern part, where it often forms thickets in abandoned fields. It can be recommended for ornamental planting. Authentic records show that a Sassafras tree once grew near Butlerville, Indiana, that was over 4 feet in diameter.

FIRE CHERRY

Prunus pennsylvanica, Linnaeus

THE Fire Cherry, also called Wild Red Cherry, Bird Cherry, and Pin Cherry is a small slender tree seldom more than 30 feet high and 12 inches in diameter.

The leaves are alternate, sometimes paired but never opposite each other. They are simple, 3 to 5 inches long and ¾ to 1¼ inches wide, finely toothed along margin, bright green and shiny on upper surface and paler below. The flowers appear about May. They are white, about one-half inch across and arranged in 4 to 5-flowered clusters. The fruit is a round, juicy, light red berry, about ¼ of an inch in diameter. The skin is thick and the flesh sour. It ripens in July-August. The bark on young trunks is reddish - brown, rather smooth. The outer bark peels off readily in thin layers and exposes the green very bitter inner bark. The twigs are slender, smooth, bright red, often covered with a thin gray coating which rubs off easily. The twigs and bark are marked with numerous pale to yellowish breathing pores. The wood is light, soft, close grained, with light brown heartwood and thin yellowish sapwood.

FIRE CHERRY

The Fire Cherry is a widely distributed tree. It is found from Newfoundland to British Columbia, southward to Georgia and Colorado. In Indiana it is frequent on the black oak ridges about Lake Michigan, but reported only from Lake, Porter, Laporte, St. Joseph and Lagrange counties. It is a short-lived tree of little commercial importance, but acts as a nurse tree to other valuable species. It furnishes food for birds and other wild life.

WITCH-HAZEL

Hamamelis virginiana, Linnaeus

THE Witch-hazel is a very interesting small tree or shrub. It has the unusual habit of blossoming late in autumn and a full year elapses between the appearance of its flowers and the maturing of its unusual fruit.

The leaves are simple, alternate, oval, 4 to 6 inches long, usually rounded at apex, oblique at base, coarsely toothed along margin, with prominent veins.

The flowers appear in October or November. They are bright yellow, and occur in few-flowered clusters.

The fruit ripens in October or November with the flowers. It is a yellowish-brown woody pod with two cells in which black shiny seeds are produced. The seeds are often propelled five or more feet when seed pods burst open.

The bark is light brown, somewhat mottled with light blotches. The twigs are light brown, smooth, zigzag. The buds are flattish, curved, brown, hairy. The terminal bud is sickle-shaped, about one-third of an inch long. Flower buds are small, round, occur on slender stalks.

The wood is hard, light brown, close-grained. It is not used commercially.

WITCH HAZEL
One-fourth natural size.
Single flower and fruit pod, enlarged.

The Witch-hazel is found from Nova Scotia to Minnesota, south to Florida and Texas. It is common in northern Indiana, decreasing southward, and becoming rare in the southwestern part. Moist and rocky situations are its favorite home. It is very tolerant of shade, which accounts for its being found commonly in the understory of the forest.

SWEET GUM

Liquidambar Styraciflua, Linnaeus

THE Sweet Gum, also called Red Gum and Liquidambar, is a handsome and symmetrical tree native to Indiana.

The leaves are simple, alternate, 3 to 5 inches long, broader than long, star-shaped, ~~six~~-pointed. In autumn they turn to a pale orange to deep red, and when crushed give off fragrant odor.

Five-Pointed

The flowers are green and of two kinds. Pollen-bearing are arranged in tassels 2 to 3 inches long. Seed-producing occur in long-stalked heads.

The fruit is a long-stalked round head made up of many capsules each containing many small seeds.

The bark on older trunks is deeply furrowed grayish-brown, and scaly. On younger trunks it is smoother and dark gray. The twigs are stout, angular, smooth, with corky winged projections. The buds are sharp-pointed, lustrous brown, fragrant when crushed.

SWEET GUM
One-fourth natural size.

The wood is rather hard, strong, reddish-brown, with white sapwood. It is used for boxes, crates, furniture and interior finishing. Large quantities are used in imitation of Circassian Walnut.

The Sweet Gum grows naturally from Connecticut to Florida and as far south as Guatemala. It is native to the southern half of Indiana and will grow in the entire state if planted. It is common in the flats and lowlands of southwestern counties, and rare in the hill counties. It should be favored in the low-lying woodlots. This tree is handsome, has a symmetrical form, grows rapidly, produces unique leaves, and has few enemies. It deserves to be planted widely for ornamental and shade uses.

WILD BLACK CHERRY

Prunus serotina, Ehrhart

THE Wild Black Cherry, also called Wild Cherry, and Black Cherry, is the only native cherry that reaches large tree size. It often attains a height of 75 feet and a diameter of 3 feet.

The leaves are simple, alternate, 2 to 5 inches long, long-pointed, finely toothed along margin, rather thick, shiny on upper surface and paler below.

The flowers are white, about ¼ of an inch across, arranged in spikes 3 to 4 inches long.

The fruit is a purplish-black juicy berry, about one-third of an inch in diameter, grouped in drooping clusters.

WILD BLACK CHERRY
One-fourth natural size.

The bark on young trunks is smooth, glossy, reddish-brown marked with conspicuous white, horizontally elongated breathing pores, peels off in thin film-like layers exposing green inner bark. On old trunks it becomes black, rough, breaks up into thick plates. The twigs are smooth, reddish-brown marked with numerous small whitish breathing pores. Twigs and inner bark have bitter taste and unpleasant odor. The buds are about ⅛ of an inch long, smooth, glossy, reddish-brown, covered with about 4 visible scales.

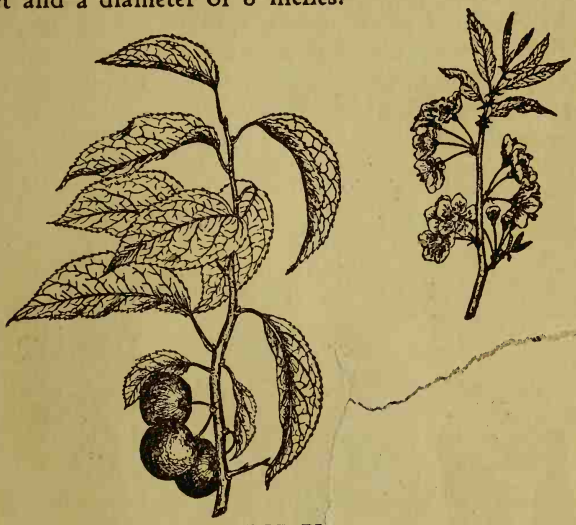
The wood is moderately heavy, hard, and strong, fine-grained, with reddish-brown heartwood. It is durable and used for furniture, interior finishings, tools, ties, implements and high-class panels.

The Wild Black Cherry is found from Nova Scotia south to Florida and west to Kansas and Texas. It occurs in all parts of Indiana. Rich bottomlands and moist hillsides are its favorite home, but it also grows on dry soil. Locally it is a pest along fences and in clearings. We need its fine wood, the birds eat its fruit, and the bees frequent its flowers

WILD PLUM

Prunus americana, Marshall

THE Wild Plum, also called Wild Red Plum, is an interesting small round-topped tree reaching a height of 25 feet and a diameter of 8 inches.



WILD PLUM

The leaves are simple, alternate, 1½ to 4 inches long, taper-pointed at apex, sharply toothed along margin, usually smooth on upper and lower surfaces.

The flowers are white, about one inch across, occur in clusters of 2 to 5 on slender stalks. They appear in April or May.

The fruit is a roundish drupe, about 1 inch in diameter, with tough skin and oval stone, becoming red at full maturity in August or September.

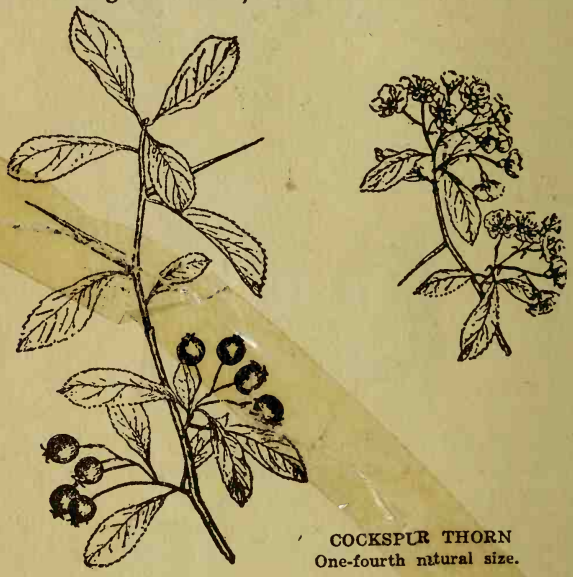
The bark is at first smooth and grayish-brown, becoming rough and dark brown. The twigs are smooth, reddish-brown and bear numerous sharp spines. The wood is hard, heavy, close-grained, and reddish-brown.

The Wild Plum is found from New York to Florida and west to Montana, Colorado and Texas. It occurs in all parts of Indiana, but is rather local in its distribution. One usually finds it along streams and in low places in the forest. Locally it forms "plum thickets." They are usually the result of root shoots. When once established it is hard to exterminate.

Closely related to the Wild Plum is the Canada Plum—Prunus nigra, Aiton—found in northern Indiana. It flowers earlier than the Wild Plum, has less sharp teeth on leaf-margins, and bears two glands on the leaf-stalks.

THE HAWTHORNS—Crataegus

THE Hawthorns comprise a big group of small trees. There are more than one thousand described species in the United States. In Indiana there are about 40 species. If one observes their flowers and fruit it is easy to see that they are closely related to the apples, plums and peaches. The most distinctive feature of their make-up is their stiff thorns on the zigzag branches. Thorn Tree, Thorn Apple and Haw are among the widely used common names.



COCKSPUR THORN
One-fourth natural size.

The two commonest and most distinctive Hawthorns of Indiana are the Cockspur Thorn and the Red Haw. The Cockspur Thorn (Crataegus crus-galli, Linnaeus) may be recognized by its long, usually unbranched, chestnut brown thorns, its inversely ovate leaves, and its small nearly spherical buds. The white flowers are grouped in round-topped clusters, and the bright apple-like scarlet fruit persists far into winter. This small tree, rarely over 20 feet high, is found throughout Indiana. The Red Haw—Crataegus mollis—has broadly ovate leaves with heart-shaped to wedge-shaped base and serrate or twice serrate margins. They are 1½ to 5 inches long and 1½ to 4 inches wide. The flowers are white, appear about May, and are arranged in many-flowered clusters. The fruit is scarlet, nearly round, ½ to 1 inch thick, with yellow edible flesh, ripens in September. The Red Haw is a frequent tree throughout Indiana, except in the extreme northwestern part. It reaches a height of 20 to 35 feet and a diameter of 4 to 10 inches.

AMERICAN CRAB APPLE

Malus coronaria, Linnaeus

THE American Crab Apple is an attractive small tree reaching a height of 20 feet and a diameter of 8 inches. The fragrance of its blossoms is one of its distinctive characteristics.

The leaves are simple, alternate, ovate, 3 to 4 inches long, sharply toothed on margins, usually smooth. The terminal ones on sterile branches are sometimes lobed.

The flowers are fragrant, rosy-white, 1½ to 2 inches across, arranged in few-flowered clusters, appear in May.

The fruit is a small, yellowish-green bitter apple, ripening about October.

The bark is reddish-brown and becomes furrowed.

The mature twigs are smooth, reddish-brown, sometimes bear stubby spurs or sharp spines. The wood is hard, heavy, light, reddish-brown.

AMERICAN CRAB APPLE

The American Crab Apple is found from Ontario to Michigan and south to Alabama and Louisiana. It occurs in all parts of Indiana, chiefly in the glaciated area on morainal ridges and slopes along streams.

The Western Crab Apple—Malus ionesis, (Wood) Britton—also occurs throughout Indiana. Its lower leaf-surfaces and leaf-stalks are densely covered with fine hairs. It rarely exceeds 15 feet in height and usually has a pyramidal crown.

JUNE BERRY

Amelanchier canadensis (Linnaeus) Medicus

THE June Berry, also called Shad Bush and Sarvice Berry, is one of the most conspicuous small trees when in full bloom early in spring.

The leaves are simple, alternate, egg-shaped, 3 to 4 inches long, sharp-pointed, finely toothed along margin, when young finely hairy.

The flowers appear just when the leaves start to come out. They are white, stalked, arranged in drooping clusters 3 to 5 inches long.

The fruit is a reddish-purple sweet berry, about one-third of an inch in diameter, coated with whitish bloom when fully ripe, matures in June or July.

JUNE BERRY
One-fourth natural size.
Flower, fruit, and twig section, enlarged.

The bark is usually smooth, grayish, often marked with black streaks. The twigs are slender, bright green to purplish-brown, smooth, marked with scattered dots. The buds are slender, conical, ¾ to ½ of an inch long, 3 to 4 times as long as wide, sharp-pointed, greenish-brown.

The wood is heavy, hard, light to dark brown, checks and warps easily. It is rarely used for commercial purposes.

The Juneberry is found from Newfoundland west to Kansas and south to Florida and Louisiana. Closely related is the Smooth Juneberry (Amelanchier laevis, Wiegand). Its leaves are nearly or quite smooth throughout the year. These two small trees occur locally throughout Indiana and rarely exceed 25 feet in height and 12 inches in diameter. Their fine floral beauty recommends their protection. They also yield delicious berries for man, birds and other animals.

SYCAMORE

Platanus occidentalis, Linnaeus

THE Sycamore, also called Buttonball, is the largest tree of Indiana.

The leaves are simple, alternate, broadly ovate, 3 to 5-lobed, 4 to 8 inches across, bright green above, pale green and white woolly below. The leaf-stalks are about 2 inches long, enlarged and hollowed at base.

The flowers are of two kinds, occur in dense ball-like heads, attached to twigs by long slender stalks.

The fruit consists of tiny seeds, arranged in ball-like heads about 1 inch in diameter, attached to twigs by long slender stalks.

The bark on old trunks is rather thick, dark brown, peels off in broad scales. On young stems and the upper part of larger trunks it peels off in thin scales exposing white, greenish and yellowish inner bark. The twigs are rather stout, at first green and fuzzy, later grayish to brown and smooth. The buds are about ¼ of an inch long, conical, dull-pointed, smooth, reddish-brown. Terminal bud is absent.

SYCAMORE
One-fourth natural size.
Flowers and twig sections, enlarged.

The wood is hard, strong, reddish-brown. It is used for boxes, furniture, novelties, charcoal, chemicals.

The Sycamore is native from Maine to Minnesota and south to Florida and Texas. Moist to wet fertile soil are its favorite home. It is found throughout Indiana. Near Worthington, Indiana, stood the largest hardwood trees in the United States. It was a Sycamore with a circumference of 42 feet and 3 inches. It was blown down in 1925. The Oriental Plane Tree, a close relative of our Sycamore, has been planted in Indiana for ornamental purposes.

COMMON LOCUST

Robinia Pseudo-Acacia, Linnaeus

THE Common Locust, also called Black Locust and Yellow Locust, is a beautiful forest tree when in full bloom. Everywhere in Indiana the locust borer is damaging it heavily. It is unquestionably the best-known American pod-bearing tree.

The leaves are alternate, compound, with 7 to 21 leaflets, 8 to 14 inches long. Leaflets are usually odd in number, short-stalked, 1 to 2 inches long.

The flowers appear in May or June, are cream-white, fragrant, resemble a pea blossom, are arranged in drooping clusters 4 to 5 inches long. The fruit is a small, dark-brown, thin pod, 2 to 4 inches long, ½ of an inch wide, contains 4 to 8 small brown seeds. The bark on both young and old trunks is red dish-brown, becomes thick, deeply furrowed. The twigs are stout, brittle, greenish to reddish-brown, bear two short spines at each node. The buds are small, imbedded in bark, and 3 to 4 occur above each other. The wood is yellowish-brown, very heavy, hard and durable. It is used for posts, insulator pins, ties, fuel and shipbuilding

COMMON LOCUST
One-fourth natural size.
Twig sections, enlarged.

The Common Locust is found from the mountains of Pennsylvania south to Georgia, west to Iowa and Kansas. It is doubtful if this tree is native in any part of Indiana, but it has been planted extensively and locally it has escaped cultivation. The most vigorous growth is made on moist fertile soil. Its valuable wood and rapid growth recommend it for planting where the Locust Borer need not be feared.

HONEY LOCUST

Gleditsia triacanthos, Linnaeus

THE Honey Locust, also called Thorn Tree, is the most beautiful pod-bearing tree found in Indiana.

The leaves are alternate, singly or doubly compound, 7 to 8 inches long. When singly compound they have 18 to 28 leaflets, and when doubly compound have 8 to 14 pinnae each with 18 to 20 leaflets.

The flowers are greenish, appear about May or June, and are of two kinds. The pollen-bearing are arranged in short tassels; the pod-bearing occur in few-flowered clusters.

HONEY LOCUST
Twig, natural size. Leaves, pod and thorn, One-fourth natural size.

The fruit is a thin, flat, more or less twisted, reddish-brown pod, 10 to 18 inches long, containing many small flat seeds and often persist far into winter.

The bark on young stems is smooth, brownish, dotted with many oblong breathing pores. On old trunks it becomes grayish-brown to black and roughened with shallow furrows and firm ridges. The branches and trunk usually bear large, three-pronged sharp-pointed thorns. The twigs are smooth, glossy, greenish-brown. The buds are very small, usually 3 at a node, and placed above one another.

The wood is hard, heavy, strong, reddish-brown with pale sapwood. It is used for posts, rails and general construction work.

The Honey Locust ranges from Ontario to Kansas and south to Pennsylvania, Florida and Texas. It occurs throughout Indiana except near Lake Michigan. The thornless variety is recommended for ornamental and street planting. It is a handsome park tree. The Water-Locust—Gleditsia aquatica—occurs in a few counties in southwestern Indiana. It has undivided spines except on trunks and short pods with only one seed.

REDBUD

Cercis canadensis, Linnaeus

THE Redbud, also called Judas Tree, is one of the most attractive small trees native to Indiana. No tree has more striking distinguishing characteristics.

The leaves are simple, alternate, heart-shaped, 3 to 5 inches long, pointed at apex, entire on margin.

The flowers appear before the leaves, resemble sweet peas, are brilliant red, occur in numerous clusters of 4 to 8 along twigs.

The fruit is a small rose-colored to light-brown, short-stalked, thin, flat pod, 2½ to 3 inches long, about ½ of an inch wide, contains 4 to 8 light-brown flat seeds.

The bark is thin, reddish-brown, peels off into thin scales. The twigs are slender, smooth, light-brown, buds are small, spherical, ⅛ of an inch across, dark purplish-red, usually occur one above another and often are grouped in small clusters at base of lateral branches.

REDBUD
One-fourth natural size.
Twig sections, enlarged.

The wood is heavy, hard, dark reddish-brown with light sapwood. It is of no commercial importance.

The Redbud is found from Ontario to Minnesota, south to Florida and Arkansas. It is frequent throughout Indiana, except in the Lake Michigan section. Rich fertile lowlands and moist hillsides are its favorite home.

It is difficult to tell at which season of the year the Redbud is most beautiful. Its spring robe of brilliant red blossoms is glorious, its summer dress is resplendent, its autumn garb of yellow trimmed with purplish pods is truly beautiful, and its winter appearance is most charming. It is planted extensively for ornamental purposes.

THE COFFEE TREE

Gymnocladus dioica, (Linnaeus) Koch

THE Coffee Tree, also called Coffee Nut Tree attracts attention because of its unusual features. Its only close relative is native to China.

The leaves are alternate, twice and sometime thrice compound, 1 to 3 feet long, 1½ to 2 feet wide. Leaflets are egg-shaped, about 2 inches long, sharp-pointed at apex, smooth to wavy along margin. The flowers appear about June, are greenish white and arranged in clusters 3 to 8 inches long. The fruit is a broad, stubby, reddish-brown pod, 4 to 10 inches long, 2 to 4 inches broad. Pods contain 6 to 9 marble-like brown seeds. The bark is dark gray to blackish-brown. The twigs are very stout, greenish-brown, often covered with a crusty coating marked with large, heart-shaped leaf-scars, contain wide pinkish to brown pith. The buds are small, downy, almost entirely imbedded in twigs, surrounded by hairy ring of bark, often placed above one another.

THE COFFEE TREE
One-fourth natural size.
Twig section, natural size.

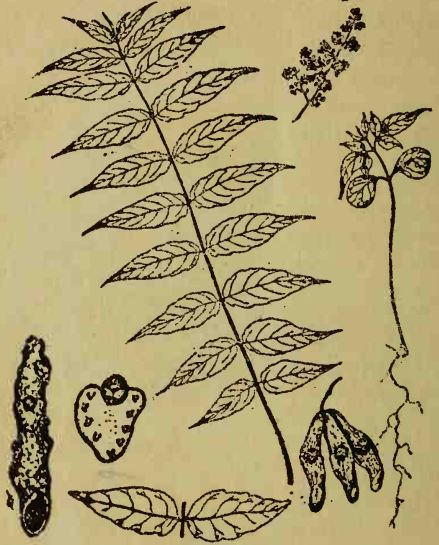
The wood is rather heavy, coarse-grained, light brown to reddish-brown. It is used for posts, rails, and locally for general construction work.

The Coffee Tree is found from central New York to Tennessee, west to Minnesota and Oklahoma. It occurs locally in most parts of Indiana, but usually occurs alone. It is rarely found in groups, is of little economic importance, and has few merits as an ornamental tree.

AILANTHUS

Ailanthus glandulosa, Desfontaines

THE Ailanthus, also called Tree of Heaven, Chinese Sumac, and Paradise Tree, is an interesting tree immigrant that came to this country from China about 150 years ago, and was planted first near Philadelphia.



AILANTHUS
One-fourth natural size.
Twig, one-half natural size. Leaf-scar, slightly enlarged.

The leaves are alternate, compound, with 11 to 31 leaflets, usually 1 to 2 feet, but occasionally 3 feet long. Leaflets are 3 to 5 inches long, egg-shaped, long-pointed at apex, smooth along margin except for a few teeth near base. They produce unpleasant smell when crushed. Glands are usually present near base of leaflets.

The flowers are small, greenish, of two kinds and arranged in loose clusters. Pollen-bearing and seed-producing occur on different trees. The fruit is a thin winged seed produced in large clusters. The bark on young trees is smooth, thin, light gray. On older trunks it becomes dark gray to black and shallowly furrowed. The twigs are very stout, yellowish-green to brown, covered with a velvety down, marked with ochre-colored breathing pores and large heart-shaped leaf-scars with 8 to 14 groups of bundle-scars. The buds are small, round, reddish-brown. The wood is light, soft, weak, white to pale yellow. It is well adapted to the manufacture of paper pulp. The Ailanthus has been planted in all parts of Indiana. In many places it has escaped cultivation and now forms dense thickets, especially along the bluffs of the Ohio River in Jefferson county.

SUGAR MAPLE

Acer saccharum, Marshall

THE Sugar Maple, also called Hard Maple and Rock Maple, is probably the best known American hardwood tree.

The leaves are simple, opposite, 3 to 5 inches long, coarsely toothed, dark green above and pale below.

The flowers are yellowish-green, appear in April and May with the leaves. Both pollen-bearing and seed-producing occur in drooping, slender-stalked clusters on the new growth.

The fruit is a two-winged maple key. The wings are about an inch long and are almost parallel to each other or slightly divergent.

The bark is grayish- to brownish black, roughened with shallow furrows. The twigs are slender, smooth, reddish to orange brown, marked with pale dots. The buds are brown, conical, sharp-pointed, covered with 8 to 10 exposed scales.

SUGAR MAPLE
One-fourth natural size.
Twig, one-half natural size. Single flowers, enlarged.

The wood is heavy, hard, close - grained, light brown to reddish. It is an all-purpose wood, being manufactured into not less than 500 articles of commerce.

The Sugar Maple is found from Newfoundland to Manitoba, south to Florida and Texas. It occurs in every State east of the Mississippi, but is rare in the South. It occurs throughout Indiana. Under favorable conditions it reaches a height of 100 feet and a diameter of 4 feet. As a timber tree the Sugar Maple has no superiors, as a memorial tree it is among the best, and as an ornamental and street tree it is in the front rank.

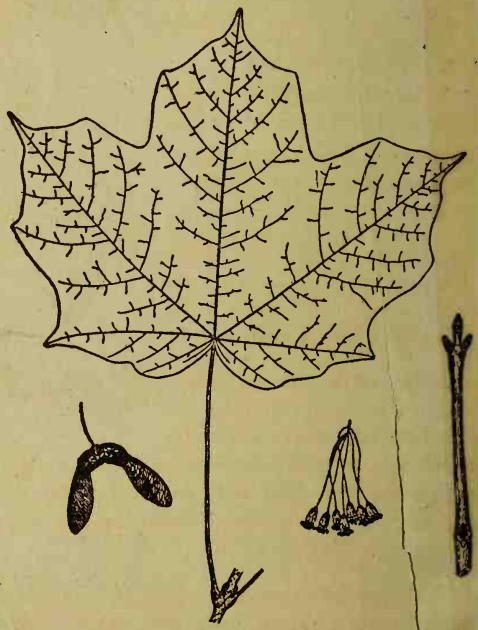
BLACK MAPLE

Acer nigrum, F. A. Michaux

THE Black Maple, also called Black Sugar is one of the most interesting and attractive trees of southern Indiana.

The leaves are simple, opposite, 3 to 6 inches long, often wider than long, with 3 main lobes and 2 smaller lower lobes, yellow green beneath and rich green above. The lower lobes of the leaves have a tendency to droop. The base of the leaf-stalks of the terminal leaves are enlarged at the base and smooth or somewhat hairy about the enlarged base. By maturity a scale-like appendage often develops on each side of the base of the leaf-stalks.

The flowers, fruit, twigs, buds, and wood are similar to those of the Sugar Maple. The bark is darker, and narrower and shallower furrowed than that of the Sugar Maple.



BLACK MAPLE

The Black Maple is found from Quebec west to South Dakota and south to Georgia and Louisiana. It occurs in all parts of Indiana and is invariably associated with the Sugar Maple and to a lesser degree with Beech. It is a medium to large tree which produces good wood, lives long, holds its foliage long, is relatively free from insect and fungous attack, and develops an attractive form. It is one of the most desirable trees for shade, street and ornamental planting.

RED MAPLE

Acer rubrum, Linnaeus

All seasons of the year the Red Maple is a beautiful tree. In autumn it is at its best. Then it stands out among maples associates as a flaming torch of scarlet and crimson.

The leaves are simple, Leaflet about 3 inches scarcely encircling to 5 lobed, pale whitish on lower The clefts between yellowish are shallow suspended sharp-angled.

RED MAPLE
One-fourth natural size.

The flowers are red, appear early in spring before the leaves, and are arranged in numerous small clusters.

The fruit is a typical two-winged maple key. The wings are less than an inch long, and not wide spreading from each other.

The bark on branches and young trunks is smooth and gray; on older trunks is grayish brown and shags off in thin plates. The twigs are smooth, red, marked with light dots. The buds are round, red, covered with 6 to 8 exposed scales, clustered in groups along twigs.

The wood is moderately hard, rather brittle, close-grained and light brown with wide and white sapwood. It is used in the manufacture of paper, berry baskets, box-boards and many small household articles.

The Red Maple is one of the most widely distributed trees of North America. It is found throughout Indiana. It usually occurs on low ground, about lakes, in marshes, and in low woods. In southeastern Indiana it grows with Sweet Gum in the "flats." In the hill country it grows on dry ridges.

The Red Maple has rare beauty, produces good wood, and grows to a height of 100 feet and a diameter of 4 feet. For ornamental planting it is superior to the Silver Maple.

SILVER MAPLE

Acer saccharinum, Linnaeus

THE Silver Maple, also called Soft Maple and T ple, is one of the best known American trees re of its wide natural range and its general use for it ornamental planting.

The leaves are simple, opposite, 5-lobed, silvery lower surface, divided by deep clefts with rounded bases. The base of the clefts of the Red Maple are sharp-angled.

The flowers are reddish to crimson, occur in compact clusters along twigs early in spring before the leaves appear.

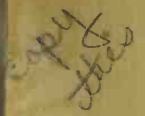
The fruit is a typical two-winged maple key. The wings are 2 to 3 inches long and wide-spreading.

SILVER MAPLE
One-fourth natural size.

The bark on branches and young stems is smooth nd gray; on old trunks becomes grayish brown d separates in thin flakes. e twigs are slender, glossy, reddish-brown, have disagree- dor if broken, are marked with many light dots. The nd, red, covered with 6 to 8 visible scales, clus- s along twigs.

is moderately hard, rather brittle, close-grained, rown with wide white sapwood. It is used in the manufacture of paper, berry baskets, box-boards and many small household articles.

The Silver Maple is found from New Brunswick to Florida and west to the Dakotas and Oklahoma. It is found throughout Indiana. In the lower Wabash bottoms it sometimes forms pure stands. Moist to wet soils, stream banks, and borders of ponds and lakes are its favorite home. This tree grows rapidly and may reach a height of 80 feet and diameter of 3 feet. Formerly it was planted extensively for ornamental purposes, but now it is rarely planted for it is short-lived, has many enemies, and suffers much from the wind, snow and ice.



BOX ELDER

Acer Negundo, Linnaeus

THE Box Elder, also called Ash-leaved Maple, is the only Indiana maple with compound leaves. All other maples have simple leaves.

The leaves are opposite, compound, with 3 to 5 leaflets. Leaflets are 2 to 4 inches long, coarsely toothed. The leaf-scars completely encircle the twigs.

The flowers are yellowish - green suspended on slender stalks in small open clusters. The pollen-bearing and the seed-producing occur on different trees.

The fruit is a typical two-winged maple key, which matures about September, occurs in drooping clusters, often persists far into winter. The wings are 1½ to 2 inches long, and usually incurved.

BOX ELDER
Leaf, one-third natural size. Twig and fruit, two-thirds natural size.

The bark on branches and young trunks is smooth and grayish-brown; on older trunks becomes dark and breaks up into shallow furrows. The twigs are stout, greenish to purplish green, smooth, often covered with a whitish crusty coating. The buds are rather large, egg-shaped, short-stalked, white-woolly, grouped at nodes in clusters of 2 to 3. The outer pair of bud-scales completely covers the inner pair.

The wood is light, soft, close-grained, creamy white, not durable. It is used in the manufacture of pulp, woodenware, barrels, and cheap furniture.

The natural range of Box Elder is equalled by few American trees. It covers almost three million square miles from New England to Alberta, south to Florida, Texas and Mexico. It is found throughout Indiana. In many places it is abundant. It escapes so freely that it is impossible to tell where it was native. One finds it chiefly along streams and in low woods, but sometimes is found on dry soil. It cannot be recommended for ornamental planting.

NORWAY MAPLE

Acer platanoides, Linnaeus

THE Norway Maple is one of the most popular street trees in the United States. There are very few towns and cities in which this tree is not found. It comes to us from Europe where it is found from Norway to Switzerland.

The leaves resemble those of the Sugar Maple but are deeper green in color and firmer in texture. One characteristic by which it can always be distinguished is the presence of milky sap in the leaf-stalks. If pressed or twisted the leaf-stalks always yield a few drops of milky sap. In early spring the yellowish-green flowers arranged in clusters along the twigs are distinctive. In winter the large, red, blunt-pointed glossy buds are a sure means of identification. In late summer the large fruit keys with wide-spreading wings ripen and may hang on the tree for months.

NORWAY MAPLE
One-half natural size.

The Norway Maple has many merits as a street tree. It is hardy, rather free from insect attacks, retains its leaves longer than the native maples, and endures well the smoke, dust and drought of the city. The maple wilt disease has been attacking this tree heavily in recent years.

Another European maple occurs locally in Indiana. It is the Sycamore Maple (Acer Pseudo-platanus, Linnaeus). It can be distinguished easily by its firm, 3 to 5-lobed leaves with sharply toothed margins and its large, blunt-pointed green buds. The fruit keys are smaller than those of the Norway Maple. It does not thrive on all kinds of soil and has not been planted extensively in Indiana.

BUCKEYE

Aesculus glabra, Willdenow

IN Indiana this tree is usually called "Buckeye." Elsewhere it is called American Horse Chestnut, Fetid Buckeye, Stinking Buckeye and Ohio Buckeye.

The leaves are opposite, compound, with 5, rarely 7 leaflets. The leaflets are egg-shaped, 3 to 6 inches long. If crushed the leaves are ill-smelling. This is one of the first of our trees to put out leaves in spring. The flowers are small, yellowish or greenish, with 4 upright petals. They are arranged in upright clusters 5 to 6 inches high and 2 to 3 inches wide. The stamens project beyond the corolla. This is one characteristic by which the Ohio Buckeye can be distinguished from the Sweet Buckeye. The fruit is a thick-round or pear-shaped prickly or warty capsule, about 1 inch in diameter, containing a large, smooth, shiny brown nut. It resembles closely the fruit of the common Horse Chestnut. The wood is soft, weak, whitish to pale yellow. It is used for paper pulp, woodenware, artificial limbs, and occasionally as lumber. The bark is grayish, breaks into scaly plates. The twigs are stout, ashy-gray to reddish brown, ill-smelling if bruised. The buds are opposite, two-thirds of an inch long, sharp-pointed, covered with reddish-brown resinous scales. The Ohio Buckeye ranges from western Pennsylvania south to Alabama, west through Ohio to Illinois, Iowa and Oklahoma. It is found in all parts of Indiana. It prefers rich moist soil, but in southern Indiana it occurs on bluffs bordering streams. It is often planted for ornamental purposes, but is now too rare in Indiana to be of economic importance.

BUCKEYE

SWEET BUCKEYE

Aesculus octandra, Marshall

THE Sweet Buckeye, also called Yellow Buckeye, and Big Buckeye is the largest member of this interesting tree group. It may reach a height of 110 feet and a diameter of four feet. The leaves are opposite, compound, with 5 and sometimes 7 leaflets. Its leaves, flowers, fruits, bark, twigs and buds resemble those of the Ohio Buckeye. It can be distinguished from the latter by its smoother and lighter colored bark. The capsule of its fruit is smooth while that of the Ohio Buckeye is warty or spiny. The anthers of its flowers remain within the corolla, while those of the Ohio Buckeye extend out beyond the corolla. The entire lower leaf surfaces are more permanently pubescent in this tree than in the Ohio Buckeye, and the buds are non-resinous. The latter characteristic is very helpful in distinguishing this tree from the Horse Chestnut which has very resinous buds.

SWEET BUCKEYE

The wood is light, soft, weak, whitish to pale yellowish. It resembles yellow poplar, for which it is often sold. It is used for paper pulp, woodenware, slack cooperage, artificial limbs, and locally for lumber and interior finishing.

The Sweet Buckeye ranges from western Pennsylvania through southern Ohio, Indiana and Illinois to Iowa and Oklahoma and south to Georgia and Texas. In Indiana it is confined to a few counties along the Ohio River, extending westward to Spencer county. On account of its poisonous fruit it has practically been exterminated in Indiana.

HORSE CHESTNUT

Aesculus Hippocastaneum, Linnaeus

THE Horse Chestnut has been carried by man from its original home in the mountains of Greece over a considerable part of the civilized world.

The leaves are opposite, compound, with 5 to 7 leaflets. The leaflets are 5 to 7 inches long, about 2 inches wide, inversely egg-shaped, arranged in fan-like form.

HORSE CHESTNUT
One-third natural size. Twig, one-half natural size.

The flowers appear in May or June, are large, white, with throats dotted with yellow and purple, arranged in upright clusters 8 to 12 inches high. The fruit is a leathery round capsule, about 2 inches across, roughened with spines, and contains 1 to 3 shining brown nuts.

The bark is dark brown, breaks up into thin plates which peel off slowly. The twigs are stout, reddish-brown, smooth obscurely dotted with breathing pores, marked with large horseshoe-like leaf-scars each with 5 to 7 groups of bundle-scars. The buds are large, sticky, varnished, reddish-brown. The wood is soft, light, weak, whitish. It is a rapid-growing tree found in every state of the Union, and planted locally as a street shade and ornamental tree in Indiana.

BASSWOOD

Tilia americana, Linnaeus

THE Basswood is a tree of many names. Among them are Linden, Linn, Lime-tree, White-wood, Beetree and Whistle-wood.

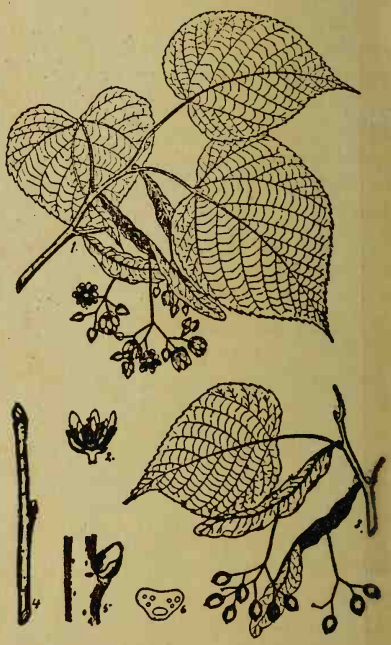
The leaves are simple, alternate, egg-shaped to round, 4 to 7 inches long, firm in texture, toothed along margin, unequally heart-shaped at base, tufts of rusty hair often occur in axils of veins.

The flowers appear in June or July. They are small, yellowish-white, sweet, fragrant, 5 to 20 in a cluster, attached to a wing-like bract by a slender stalk.

The fruit is a woody, nut-like berry about the size of a pea. It usually occurs in small clusters attached to a wing-like bract by slender stalks, often persists far into winter.

The bark on young stems is smooth and dark gray, on older trunks it is thick and clearly furrowed.

The twigs are smooth, shiny, rather stout, bright red. The buds are egg-shaped, 2-ranked, stout, blunt-pointed, usually deep red, with 3 visible bud-scales.



BASSWOOD
One-fourth natural size.
Twig, one-half natural size. Flower, leaf-scar and twig section, enlarged.

The wood is light, soft, light-brown to nearly white. It is used in the manufacture of paper pulp, crates, furniture, kegs, pails, berry baskets.

The Basswood is found from New Brunswick to Manitoba, southward to Georgia and Texas. It is common in the woods of northern and central Indiana, and occasional southward in the State. Rich, moist bottomlands and hillsides are its favorite home. It reaches a height of 70 to 80 feet and sprouts freely.

In the counties of Indiana near the Ohio River is found the White Basswood (Tilia heterophylla, Vent.). Its leaves are densely white or grayish hairy on lower surfaces.

FLOWERING DOGWOOD

Cornus florida, Linnaeus

THE Flowering Dogwood is among the best-known trees of eastern North America.

The leaves are simple, opposite, 3 to 5 inches long, 2 to 3 ches wide, smooth wavy along mar- n, often clustered end of twigs. In utumn they become beautiful red.

The flowers appear out April in green- h clusters surround- l by large white acts.

The fruit is a scar- t berry about three- ths of an inch long ranged in clusters 2 to 5.

The bark on oung stems is nooth, light brown reddish-gray; on d stems becomes ddish-brown and ivides into squarish locks.

The twigs are usu- ly smooth, red, nged with green, ften glossy. The ower buds are gob- t-like, about two- fths of an inch in iameter. The leaf uds are smaller, flat- ned, slightly hairy. he wood is hard, eavy, strong, red- ish-brown to pink- h, with light sapwood. It is used for tool handles, en- avers' blocks, shuttles, golf stick heads.

FLOWERING DOGWOOD
One-third natural size.

The flowering Dogwood is found from Massachusetts to lichigan, Florida and Texas. It is occurs in all sections of ndiana.

BLACK GUM

Nyssa sylvatica, Marshall

THE Black Gum, also called Sour Gum, Tupelo, and Pepperidge, is at its best in autumn when the entire crown is often clothed with a complete garment of flaming red. In winter when the foliage is off it has a strikingly picturesque form. The stem often continues from the base to the tip without dividing. In young and middle-aged trees the top branches take an upright position, the lower ones droop, while those along the middle stand out horizontally.

BLACK GUM
Leaves and fruit, one-third natural size. Twig, natural size. Bud and leaf-scar, enlarged

The leaves are simple, alternate, 2 to 5 inches long, oval, blunt-pointed, wedge-shaped at the base, smooth along margin.

The twigs are smooth, grayish-brown, and dotted with crescent-shaped leaf - scars each marked with three distinct bundle - scars. The buds are reddish-brown and scattered alternately along twigs.

On young trunks the bark is smooth to scaly. It breaks into squarish reddish-brown to black blocks on older stems.

The fruit is a dark blue fleshy berry about two-thirds of an inch long. Each berry contains a single hard-shelled seed. Several berries usually occur in a slender-stalked cluster. Some birds eat the berries freely.

The wood is very tough and cross-grained. It is hard to work, warps easily, and is not durable in contact with the soil. Farmers have disliked the wood ever since they attempted to split it for rails. In the hard coal mines it is used for rollers carrying ropes and cables.

The Black Gun is found from Maine to Florida, west to Michigan and Texas. It occurs throughout Indiana, being rare in the northern part. It generally grows on moist ground. In the southwestern counties it grows on slopes and sandy ridges. It reaches a height of 80 feet and a diameter of 3 feet.

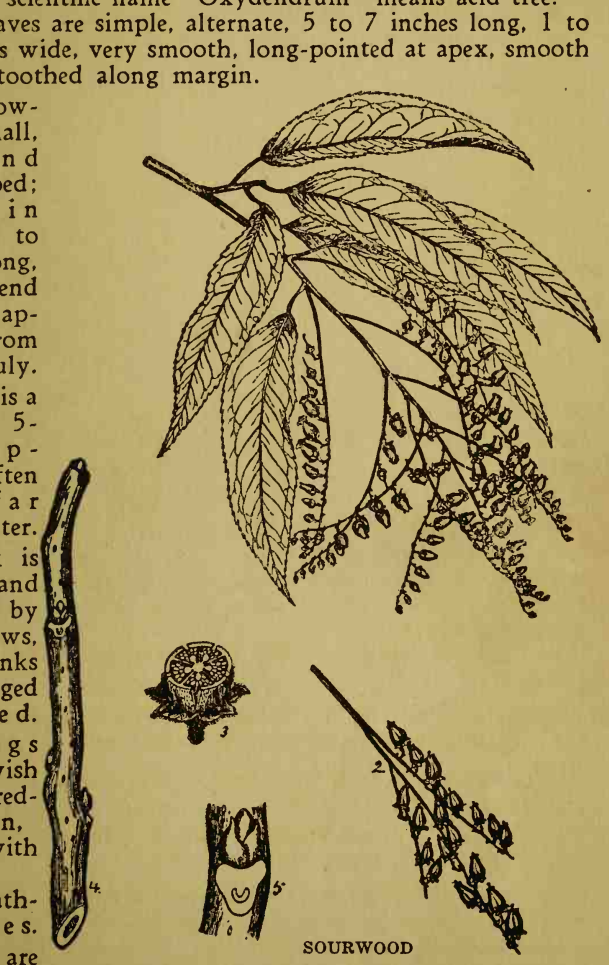
SOUR-WOOD

Oxydendrum arboreum (*Linnaeus*) *De Candolle*

THE Sour-wood, also called Sorrel Tree and Sour Gum has appropriate common names for its foliage is very sour. Its scientific name "Oxydendrum" means acid tree.

The leaves are simple, alternate, 5 to 7 inches long, 1 to 2¼ inches wide, very smooth, long-pointed at apex, smooth to finely toothed along margin.

The flowers are small, white, and urn-shaped; arranged in racemes 6 to 8 inches long, occur at end of twigs, appear from June to July. The fruit is a 5-sided, 5-valved capsule. It often persists far into winter. The bark is grayish and roughened by deep furrows, on old trunks often tinged with red. The twigs are yellowish green to reddish-brown, marked with numerous raised breathing pores. The buds are small, partly imbedded in bark, covered with several opposite reddish scales. The wood is heavy, hard, reddish-brown with lighter sapwood. It is used for home-made sled runners, mine props, charcoal, tool handles and fuelwood.



SOURWOOD

The Sour-wood ranges from southwestern Pennsylvania, southern Ohio and southern Indiana to Florida and western Louisiana. In Indiana it is definitely known to occur only on the Van Buren ridge about seven miles southeast of Cannelton. Here it is common over an acre or two. The largest tree on the area was 40 feet high.

PERSIMMON

Diospyros virginiana, Linnaeus

THE Persimmon is best known by its fruit, which is the largest berry produced by any American forest tree. There is no better way to get acquainted with this tree than to try to eat its fruit before it is ripe. Its harsh puckery taste draws the lips and chokes the throat.

PERSIMMON
One-half natural size.

The fruit is a reddish-yellow pulpy berry, one to one and one-half inches in diameter. The bitterness disappears with maturity of fruit. The leaves are simple, alternate, oval, shiny, 4 to 6 inches long, sharp-pointed, smooth along margin. The twigs are reddish-brown, with rather large pith. They bear broadly egg-shaped buds, are marked with half-moon shaped leaf-scars with only one bundle-scar. The bark is deeply furrowed, breaks into dark gray to black squarish blocks separated by furrows that are cinnamon-red along the bottom.

The yellowish to white flowers appear in May.

The wood is hard, heavy and strong. The heartwood is brown to black; the sapwood is wide and white to yellowish. It is used for golfstick heads and shuttles.

The Persimmon is found from Rhode Island to Florida, west to Kansas and Texas. It thrives best on the light sandy soil of the warm South. It is frequent to common in parts of southern Indiana. Locally it forms thickets in abandoned fields.

WHITE ASH

Fraxinus americana, Linnaeus

THE White Ash, also called Gray Ash, is the most beautiful and useful of our native Ashes. It stands among the most important forest trees.

The leaves are opposite, about 10 inches long, compound, with 5 to 9 leaflets. Leaflets are 3 to 5 inches long, evidently stalked, smooth or obscurely toothed on margin, smooth and dark green above, silvery white below.

The flowers are of two kinds. The pollen-bearing occur in dense reddish-purple clusters, the seed-producing in rather open pinacles.

The fruit is a winged seed, 1 to 2 inches long. The wing is long, narrow, attached to the end of seed. The seeds are grouped in loose drooping clusters.

WHITE ASH
One-fourth natural size.

The grayish-brown, and rather thick bark soon becomes rough, dividing into diamond-shaped fissures. The twigs are smooth, grayish-brown, flattened at nodes, marked with scattered pale dots. The buds are opposite, egg-shaped, dark brown, blunt-pointed. Terminal buds are larger than the laterals.

The wood is very heavy, hard, tough, elastic, with light sapwood and brownish heartwood. It is used widely, particularly for athletic equipment, agricultural implements, tools, furniture, and interior finishings.

The White Ash is found from Nova Scotia to Minnesota to Florida and Texas. It is common in all parts of Indiana being most abundant in the glaciated region, that is, the northern two-thirds of the State. where it is associated with Beech, Sugar Maple, Linn, Slippery Elm and Red Oak. It grows best in rich moist soils. It becomes a large tree, often 70 to 90 feet high and 3 feet in diameter, grows rapidly, is easily propagated.

BLACK ASH

Fraxinus nigra, Marshall

THE Black Ash is a tree of the swamps or other moist places. The early settlers called it Hoop Ash and the Indians called it Basket Ash.

The leaves are opposite, 10 to 14 inches long, compound, with 7 to 11 leaflets. The leaflets are 3 to 5 inches long, finely toothed along margin, all are stalkless except the terminal one.

The flowers are similar to those of White Ash.

The fruit is a winged seed similar to that of White Ash, but is broader winged, notched at apex, and the wing completely surrounds the flattened seed.

The bark is thin, grayish, very shallowly furrowed, peels off in thin scales, and if rubbed or crushed becomes powdery. The twigs are smooth, stout, light-gray. The buds are opposite, black, sharp-pointed.

BLACK ASH
One-fourth natural size.

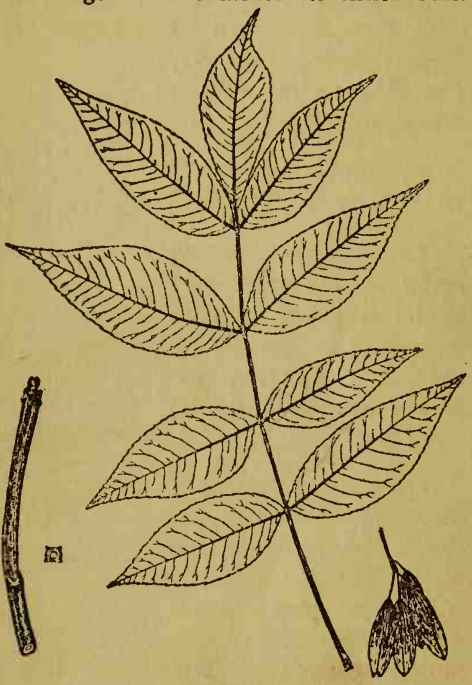
The wood is soft, rather coarse-grained, with white sapwood and dark brown heartwood. It is used for baskets, hoops, furniture, and interior finishings.

The Black Ash is found from Newfoundland to Manitoba, south to Virginia and Arkansas. It is found in all parts of Indiana except in the southern counties. Bur Oak, Red Maple and White Elm are among its chief associates. In swampy woods it is sometimes the principal tree. It is one of the first trees to invade extinct Tamarack swamps.

BLUE ASH

Fraxinus quadrangulata, Michaux

THE Blue Ash is perhaps the easiest of all our native ash trees to recognize. At all seasons of the year it can be identified by its four-sided twigs with four ridges projecting out from the bark. On very vigorous shoots corky wings extend out from these ridges. In summer its inner bark yields a blue coloring if mixed with water, whence its name Blue Ash.



BLUE ASH

The leaves are opposite, greenish-yellow, compound with 7 to 11 leaflets borne on very short stalks or sometimes stalkless. The veins, midribs and leaflet stalks are permanently pubescent. The rest of the leaf is generally smooth.

The fruit is winged to the base. The wing completely surrounds the seed. It resembles that of the Black Ash.

The bark is light gray, scaly or flaky, not fissured. It is similar to that of Black Ash.

The wood is intermediate in quality between that of White Ash and Black Ash and is generally sold as White Ash.

The Blue Ash ranges from southern Ontario to Iowa and south to northern Alabama and Arkansas. This tree is found sparingly in all parts of Indiana, except the northwestern. It is most abundant in the southeastern part. One usually finds it on the bluffs of streams or well up on the slopes of ridges. It is generally found on high ground. This tree is becoming too scarce in Indiana to be of commercial importance.

OTHER INDIANA ASH TREES

Closely related to the White Ash is the Biltmore Ash—Fraxinus biltmoreana, Beadle. It can be distinguished from the former by its twigs and axis of leaves which are velvety pubescent, at least when young. This tree is found in all parts of Indiana, except in the extreme northern counties. It nearly always grows on dry soil. Its wood is sold as White Ash.

* * * *

Another tree rather closely related to the White Ash is the Green Ash—Fraxinus lanceolata, Borckhausen. It is also called Swamp Ash and White Ash. It is a tall, straight tree, but does not reach the dimensions of the true White Ash with which it is closely associated. One always finds it in swamp woods, and it is quite common in the lake region and on the river bottoms of Indiana. Its twigs are smooth or nearly so, and the body of the fruit is flattened, passes gradually into the wing, and is usually winged for more than 1/3 its length. It has been planted extensively in the West and Northwest.

Closely related to the Green Ash and often grouped with it is the Red Ash—Fraxinus pennsylvanica, Marshall. It is found sparingly in all parts of Indiana. The Red Ash is usually distinguished by its velvety twigs, more evenly and more numerously toothed leaf margins.

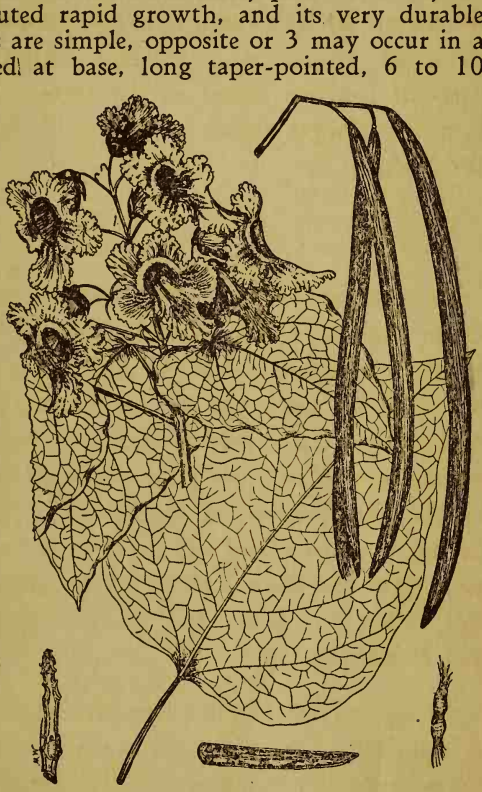
* * * *

In the river sloughs and cypress swamps of southwestern Indiana is found the Swell-butt Ash—Fraxinus profunda, Bush—also called Pumpkin Ash. It has robust, hairy twigs, and its fruit is 2 to 3 inches long with wings extending along the sides of the body.

CATALPA

Catalpa speciosa, Warder

THIS Catalpa, also called Catalfa, Hardy Catalpa, Indian Bean and Cigar Tree, was formerly planted widely on account of its reputed rapid growth, and its very durable wood. The leaves are simple, opposite or 3 may occur in a whorl, heart-shaped at base, long taper-pointed, 6 to 10 inches long, 4 to 5 inches wide. The odor of bruised leaves is not fetid. The flowers appear in May or June, are white with yellowish and purplish spots within, arranged in large erect clusters 8 to 10 inches high. The lower lobe of the corolla is notched. The fruit is a long bean-like capsule containing many flat-winged seed. It often persists far into winter. The bark on old trees is fissured and ridgy, dark grayish - brown. The twigs are stout, smooth, yellowish - brown, marked with large leaf-scars. The buds are very small, less than ⅛ of an inch long, often imbedded in bark.



CATALPA

The wood is durable, light brown, with satiny surface and kerosene-like odor. It is especially well suited for fence posts and rails. The Hardy Catalpa was originally native from southwestern Indiana to southeastern Missouri and northeastern Arkansas. Insect and frost damage have checked the growth of many plantations. It should not be planted in any part of Indiana for economic purposes, nor is it a desirable street tree—an occasional specimen tree does well. Another Catalpa—Catalpa bignonioides, Walter—a native of the southern states, is less hardy, remains smaller and its stem is usually less straight.

A TREE RECORD

EVERY boy and girl that studies trees will find it interesting to keep a record of every different kind that can be found. In years to come this tree record will be a precious possession, and serve as a pleasant reminder of days among the trees. In any locality one should find 25 different trees and in many places 50 or even more can be found.

List the trees you have met on your hikes, about the camp, or along the roadside on this sheet and opposite each tree name enter the page of this booklet upon which it is described. The boy or the girl who can fill up all the following blank spaces will know more than twice the number of trees required to pass the tree test in scouting. To know 25 trees means that you are acquainted with about one-third of all the common trees of Indiana. This is an accomplishment of which you will have a right to feel proud. Today is the best time to begin your tree record.

	NAME OF TREE	DESCRIBED ON PAGE
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Name

TREE TESTS

THE best way to find out if you really know trees is to organize a tree test among your friends. I know of no more delightful out-of-doors pastime for a group of boys or girls than to go out among the trees and actually find out who can come out on top in a tree-naming contest. The first thing to do is to select a leader, if you do not already have one. He will select the trees for the test. After you have examined the first test tree carefully, you will write your answer in the blank space following the number one in the blank tree tests that follow. Then, the leader will select a second tree and you will write your answer in the second blank space following the number two, and so on until your first test of ten trees is completed. As soon as a test is completed the test sheet of all who took part in the contest is corrected, and then you will know just how well you know the trees. For thirteen years the author of this booklet conducted tree tests in the open, and he remembers them as the most pleasant feature of all his teaching experiences.

TREE TEST—I.

NAME OF TREE

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Name.....

TREE TEST—II.

NAME OF TREE

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Name.....

INSPIRATION IN TREES

By CHARLES LATHROP PACK,

President, American Tree Association

TO the trees the poet and the orator have turned all through the ages for some of their finest word settings. One that has great appeal is that of the Rev. Francis E. Clark, founder of the Christian Endeavor Societies of the world, who refers to "the Creator as the Great Tree Maker."

THEN, TOO, there is the sentiment the Father of Arbor Day, J. Sterling Morton, left in the wonderful memorial grove he planted in Nebraska when he arranged for a tablet, among the trees he loved, which says: "If ye seek my monument look around you."

TREES, man's best friend, the friend without whom existence is impossible, picture life in all its variety. Look at the wind-swept coast and there you will find struggling for existence among the rocks, the trees. Thus does man, buffetted by the winds of fortune, struggle. You will find the trees clinging to river banks in their endeavor to hold those barriers in place against the flood time. Again you will find the trees mothering the springs and protecting them from the ravages of the sun that they may feed first the rivulet, then the stream that at last becomes the mighty river of commerce.

WE can look back through the ages and find that when the trees have gone, civilizations have disappeared. Nature is the great teacher, and when man violates her laws he must pay a terrible penalty. Nature works slowly, but her decisions and ends are sure as the coming and going of the sun. To Nature's laws man must give heed if he continues to inhabit the earth, for all life is bound up in her mandates.

WE see this enthralling mystery of life everywhere; in the seed that becomes the apple blossom; the flower that gives its nectar to the honey maker; in the roots of the tree that, buried, nevertheless gives back ever renewing life as a reward to those who plant. Kilmer pen-pictured this in that immortal verse about the "tree that looks at God all day and lifts its leafy arms to pray."

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